برنامج التحوّل الوطني 2020

التجمع الصحي الثاني بالمنطقة الوسطى
Second Health Cluster in Central Region

Collectors Of the Truth Committee

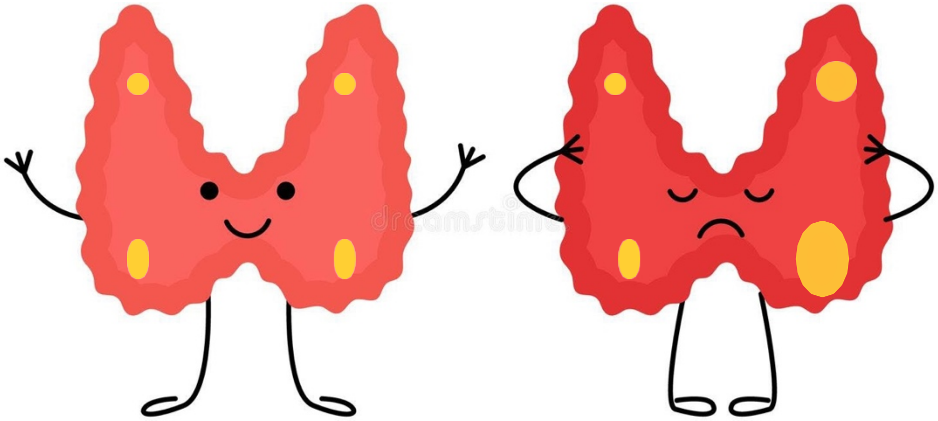
COTC

01/02/2023

مدينة الملك فهد الطبية
King Fahad Medical City
مستشفى النساء التخصصي
Women's Specialized Hospital

Table of Contents

THYROID AND PARATHYROID DISORDERS 2
PITUITARY AND ADRENAL DISORDERS 54
HYPERTENSION 79
SMOKING CESSATION 155
DYSLIPIDEMIA 173
GERIATRICS 194
DIABETES MELLITUS 266
ANEMIA 355
JAUNDICE 376
VIRAL HEPATITIS LABS INTERPRETATIONS 392
CHILDHOOD MENTAL AND BEHAVIORAL DISORDERS 432
RED EYE 464



Thyroid and Parathyroid Disorders

Collected by: Hanan AlAbdullah R2
Reviewed by: Ibrahim Alhoshan R2
Editing and final revision: Nuha Aalmasoud R3

Hypothyroidism

Causes of Hypothyroidism
Primary hypothyroidism
Chronic autoimmune thyroiditis (most common)
Iatrogenic: Thyroidectomy, Radioiodine therapy or external irradiation.
Iodine deficiency or excess
Drugs: thionamides, lithium, amiodarone, interferon alfa, interleukin-2, tyrosine kinase inhibitors, checkpoint inhibitor immunotherapy
Infiltrative diseases: fibrous thyroiditis, hemochromatosis, sarcoidosis.
Transient hypothyroidism: Painless (silent, lymphocytic) thyroiditis, Subacute granulomatous thyroiditis, Postpartum thyroiditis, Subtotal thyroidectomy, Following radioiodine therapy for Graves' hyperthyroidism, Following withdrawal of suppressive doses of thyroid hormone in euthyroid patients.
Congenital thyroid agenesis, dysgenesis, or defects in hormone synthesis.
Central hypothyroidism
TSH deficiency
TRH deficiency

Clinical features		
Symptoms		
fatigue	cold intolerance	weight gain
constipation	arthralgia	myalgia
difficult concentrating	memory impairment	depression
hair loss/thinning	menstrual irregularities	dry skin
Physical signs		
goiter	bradycardia	diastolic hypertension
Pleural and pericardial effusion	Edema	Periorbital edema
Hypothermia	Cognitive impairment	Lateral eyebrow thinning
Coarse facies	delayed relaxation phase of the deep tendon reflexes	

Diagnosis:

Labs:

- **TFT**: ↑TSH, ↓T4 (Primary), ↓TSH, ↓T4 (central).
- Other findings (not needed for diagnosis): Elevated CRP, Hyperprolactinemia, Hyponatremia, Increased creatine kinase, Increased LDL, Increased triglycerides, Proteinuria, Normocytic anemia.

Screening:

- Family physicians should evaluate for thyroid dysfunction in all patients with symptoms of hypothyroidism.
- The AAFP does not recommend screening for hypothyroidism in asymptomatic adults
- Screening of asymptomatic patients may be considered in those with risk factors for hypothyroidism, such as a history of autoimmune disease, history of head or neck irradiation, previous radioactive iodine therapy, presence of a goiter, family history of thyroid disease, or treatment with drugs known to influence thyroid function.

Treatment:

Most patients with hypothyroidism will require lifelong thyroid hormone therapy. Because T3 preparations have short biologic half-lives, hypothyroidism is treated almost exclusively with once- daily synthetic thyroxine (T4) preparations.

Timing of dose

- Should be taken on an empty stomach with water.
- 30-60 min before breakfast.
- Should not be taken with other medications that Interfere with its absorption, such as calcium carbonate, aluminum- containing antacids, sucralfate, iron supplements.
- Missed dose should be taken as soon as possible. However, if it is almost time for the next dose, skip the missed dose and go back to your regular dosing schedule. Do not double doses.

Levothyroxine Dosing Guidelines for Hypothyroidism in Adults	
Population	**Dosing**
Nonpregnant patients	1.6 mcg per kg per day initial dosage
Older patients; patients with known or suspected cardiac disease	25 or 50 mcg daily starting dosage; increase by 25 mcg every three to four weeks until full replacement dosage reached
Pregnant patients	Increase to nine doses weekly (one extra dose on two days of the week) at earliest knowledge of pregnancy; refer to endocrinologist
Patient with subclinical hypothyroidism	TSH < 10 mIU per L: 50 mcg daily, increase by 25 mcg daily every six weeks until TSH = 0.35 to 5.5 mIU per L
	TSH ≥ 10 mIU per L: 1.6 mcg per kg per day

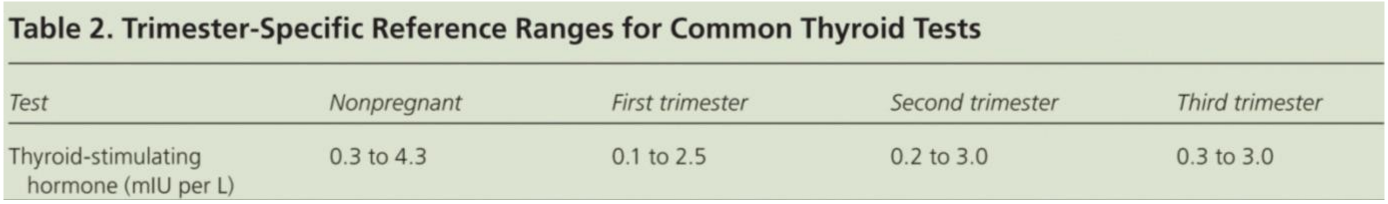


Table 2. Trimester-Specific Reference Ranges for Common Thyroid Tests

Test	*Nonpregnant*	*First trimester*	*Second trimester*	*Third trimester*
Thyroid-stimulating hormone (mIU per L)	0.3 to 4.3	0.1 to 2.5	0.2 to 3.0	0.3 to 3.0

Follow up after treatment with levothyroxine:

After initiation of T4 therapy, Symptoms may begin to resolve after two to three weeks, however the patient should be reevaluated and serum TSH should be measured in six weeks and the dose adjusted accordingly.

Reasons for Endocrinology Consultation in Patients with Hypothyroidism

- Age younger than 18 years.
- Cardiac disease.
- Coexisting endocrine diseases.
- Myxedema coma suspected.
- Pregnancy.
- Presence of goiter, nodule, or another structural thyroid gland abnormality.
- Unresponsive to therapy.

Myxedema coma is a rare but extremely severe manifestation of hypothyroidism that most commonly occurs in older women who have a history of primary hypothyroidism. Because myxedema coma is a medical emergency with a high mortality rate, even with appropriate treatment, patients should be managed in the ICU unit where proper ventilatory, electrolyte, and hemodynamic support can be given.

Subclinical hypothyroidism

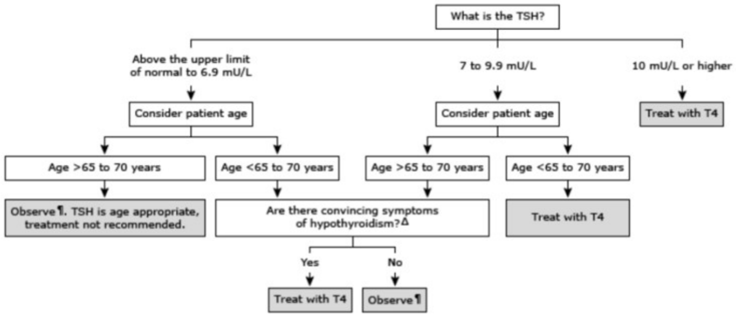
Subclinical hypothyroidism may occur in the presence or absence of mild symptoms of hypothyroidism.

Diagnosis:

Labs:

TFT: ↑TSH, normal T4

Consequences of subclinical hypothyroidism: Many patients with subclinical hypothyroidism eventually develop overt hypothyroidism. It may also be associated with an increased risk of cardiovascular disease particularly when the serum TSH concentration is above 10 mU/L.


What is the TSH?
Above the upper limit of normal to 6.9 mU/L
7 to 9.9 mU/L
10 mU/L or higher
Consider patient age
Consider patient age
Treat with T4
Age >65 to 70 years
Age <65 to 70 years
Age >65 to 70 years
Age <65 to 70 years
Observe¶. TSH is age appropriate, treatment not recommended.
Are there convincing symptoms of hypothyroidism?Δ
Treat with T4
Yes
No
Treat with T4
Observe¶

Treatment of Subclinical hypothyroidism

- TSH > 10 mU/L
- Older patients > 65 years with TSH 7.0 - 9.9 mU/L.
- Patients with high titers of anti-TPO antibodies, who may rapidly progress to overt hypothyroidism.
- Patients with goiter.
- Infertility or attempting pregnancy.

Monitoring untreated patients:

For patients with subclinical hypothyroidism who do not receive thyroid hormone replacement, we repeat thyroid function tests (TSH, free T4) initially at six months and, if stable, yearly thereafter.

Thyroiditis

Classification of thyroiditis:

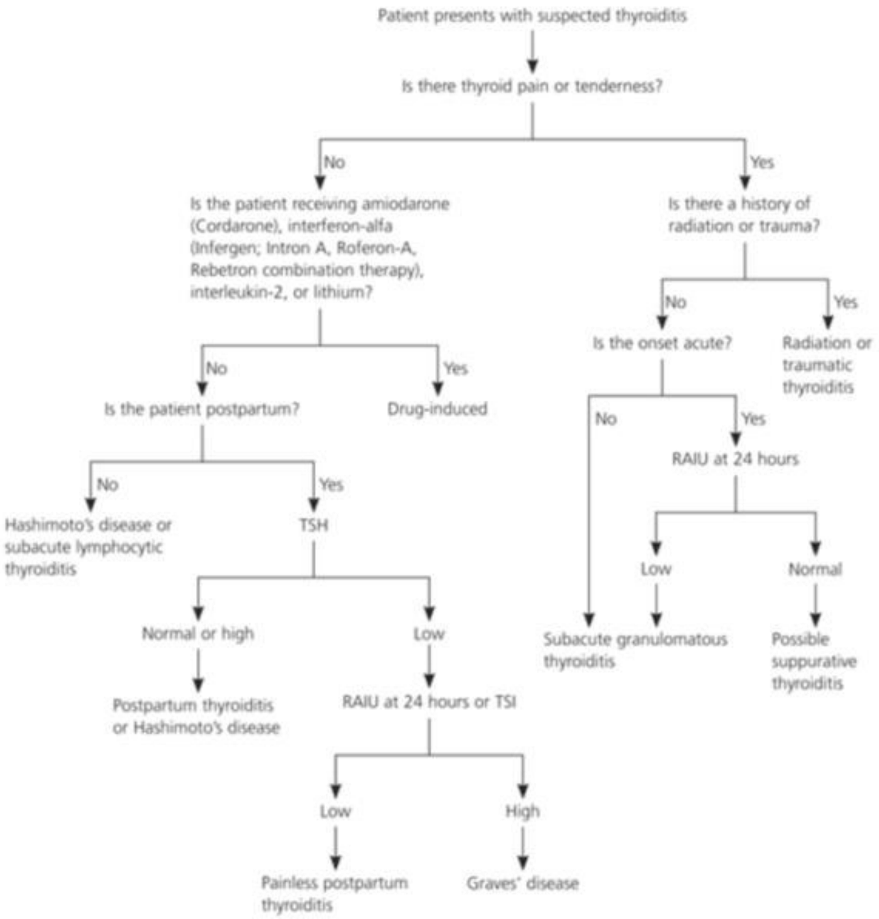
a) Painless

- Chronic Lymphocytic thyroiditis (Hashimoto's).
- Silent thyroiditis.
- Invasive fibrous: Riedel's thyroiditis.
- Drug induced: Interferon-alpha, Interleukin-2, Lithium, Tyrosine kinase inhibitors.
- Subacute Lymphocytic: Post-partum, Sporadic.

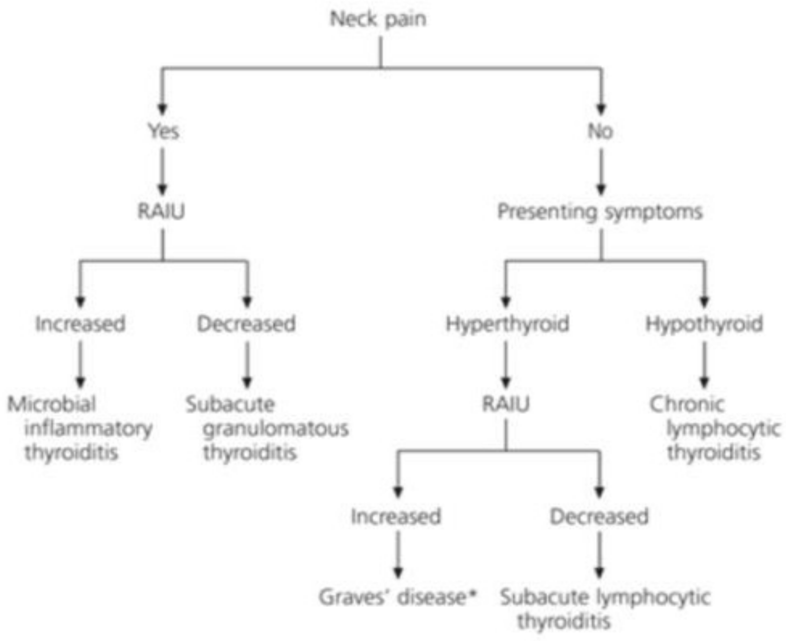
b) Painful

- Microbial suppurative (Acute).
- Radiation induced thyroiditis
- Palpation or trauma induced thyroiditis
- Granulomatous: Subacute Granulomatous thyroiditis, de Quervain's thyroiditis.

Algorithm for the Diagnosis of Suspected Thyroiditis


Patient presents with suspected thyroiditis
Is there thyroid pain or tenderness?
No
Yes
Is the patient receiving amiodarone (Cordarone), interferon-alfa (Infergen; Intron A, Roferon-A, Rebetron combination therapy), interleukin-2, or lithium?
Is there a history of radiation or trauma?
No
Yes
No
Yes
Is the patient postpartum?
Drug-induced
Is the onset acute?
Radiation or traumatic thyroiditis
No
Yes
No
Yes
RAIU at 24 hours
Hashimoto's disease or subacute lymphocytic thyroiditis
TSH
Low
Normal
Normal or high
Low
Subacute granulomatous thyroiditis
Possible suppurative thyroiditis
Postpartum thyroiditis or Hashimoto's disease
RAIU at 24 hours or TSI
Low
High
Painless postpartum thyroiditis
Graves' disease

Differentiating Thyroiditis


Neck pain
Yes
No
RAIU
Presenting symptoms
Increased
Decreased
Hyperthyroid
Hypothyroid
Microbial inflammatory thyroiditis
Subacute granulomatous thyroiditis
RAIU
Chronic lymphocytic thyroiditis
Increased
Decreased
Graves' disease*
Subacute lymphocytic thyroiditis

*—*Graves' disease is not a subtype of thyroiditis.*

Hashimoto's (Chronic):

- Most common cause of hypothyroidism in the US.
- 95% of cases are in females between the age of 30-50.
- Associated with other Autoimmune conditions (SLE, RA, DM).

History: Asymptomatic.

Physical exam: firm, irregular goiter, symmetrical enlargement.

Lab:

- Normal ESR and WBC's.
- Elevated Thyroid specific autoantibodies.
- Thyroglobulin.
- Thyroid peroxidase.
- Thyroid-stimulating hormone.

Treatment:

- If hypo levothyroxine, if hyper Beta Blocker and PTU or methimazole.
- Follow up with TSH every 3-12 months.

Subacute Lymphocytic

- Occurs mostly in the post-partum period, may also occur sporadically.
- Some references classify post-partum and sporadic as post-partum and painless thyroiditis (the main deference is that the likelihood of post-partum to convert to hypothyroidism is higher), they are both immune-mediated and self-limited
- Starts with hyperthyroid stage, then hypothyroid then a return to euthyroid.
- It occurs within one year of parturition, miscarriage, or medical abortion. Typically, the hyperthyroid phase occurs one to six months postpartum and persists for one to two months Euthyroidism is generally achieved by 18 months.

Diagnosis: TSH testing is indicated for symptomatic patients, WBC's and ESR is normal, patient usually present in the hyperthyroid stage.

Treatment: (treat hypo/ hyper)

- Propranolol is the BB of choice in breastfeeding.
- annual TSH follow up (30-50% develop permeant hypothyroid).

Subacute Granulomatous

- Most common cause of painful thyroid gland.
- Most likely caused by viral infection and generally preceded by URTI.
- Normal ESR rules out the diagnosis.
- Similar course to post-partum, Hyperthyroid followed by Hypo and then return to normal in most cases (permeant hypo in 5%).

Treatment:

- NSAID's and prednisone.

Microbial and Invasive fibrous Microbial:

- Gram positive bacteria in the thyroid gland (S. aureus),
- symptoms indicate infective cause, hyperthyroid and nodular goiter.
- Diagnosed by FNA of nodule, treated by IV Abx.

Invasive Fibrous:

- Riedel's Struma, similar presentation to thyroid cancer, rarest type of thyroiditis.
- Diagnosed by true cut biopsy and treated by surgical resection

Drug induced Thyroiditis

- **Interferon alfa, Interleukin-2, Lithium**
- **Amiodarone**: consists of 37% iodine, it interferes with the thyroid gland in deferent ways:
    - Hyperthyroidism by increased synthesis or destruction(thyroiditis).
    - Hypothyroidism via antithyroid action of Iodine especially inpatient with a pre-existing thyroid dysfunction.

Hyperthyroidism

The common endogenous causes of hyperthyroidism are:

- Graves' disease
- toxic multi-nodular goiter
- toxic adenoma
- painless thyroiditis

Differentiation between painless thyroiditis and hyperthyroidism:

Painless thyroiditis should be assumed in all men and women who:

1. Hyperthyroidism symptoms for less than 2 months.
2. Small diffused goiter or no enlargement.
3. No Graves' ophthalmopathy or pretibial myxedema.

Clinical features	
Adrenergic	Palpitations, tachycardia, anxiety, tremor, jitteriness, diaphoresis, heat intolerance, stare, lid lag, hyperdefecation (not diarrhea).
Cardiovascular	Tachycardia, irregular pulse (in atrial fibrillation), dyspnea, orthopnea, and peripheral edema (in heart failure).
Hyper-metabolism	Weight loss despite increased appetite, fever (in thyroid storm).
Cutaneous	Onycholysis (Plummer nails), patchy or generalized hyperpigmentation (especially on the face and neck).
Ocular	Increased lacrimation, incomplete closure of the eyes when sleeping reported by the patient's partner, photophobia, increased eye sensitivity to wind or smoke, grittiness or sensation of a foreign body or sand in the eyes.
Neuromuscular	Brisk peripheral reflexes with accelerated relaxation phase and weakness of proximal muscles.
Neuropsychiatric	Anxiety, rapid and pressured speech, insomnia, psychosis (if hyperthyroidism is severe).
Symptoms pathognomonic for Graves' disease	
Cutaneous	pretibial myxedema (thyroid dermopathy) and thyroid acropachy (clubbing of fingers and toes accompanied by soft tissue swelling of the hands and feet), Patchy vitiligo can also be observed in Graves' disease.
Ocular	exophthalmos, periorbital edema, diplopia, blurred vision, reduced color perception.

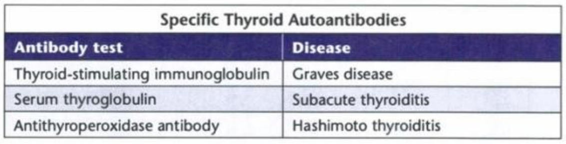
Diagnosis:

Labs:

- **TFT**: ↓TSH, ↑T4 (Primary), ↑TSH, ↑T4 (central).
- **Serology**: The serum level of thyroid-stimulating immunoglobulins or TSH-receptor antibodies helps distinguish Graves' disease from other causes of hyperthyroidism in patients who lack signs pathognomonic of Graves' disease and have a contraindication to radioactive iodine uptake and scan.

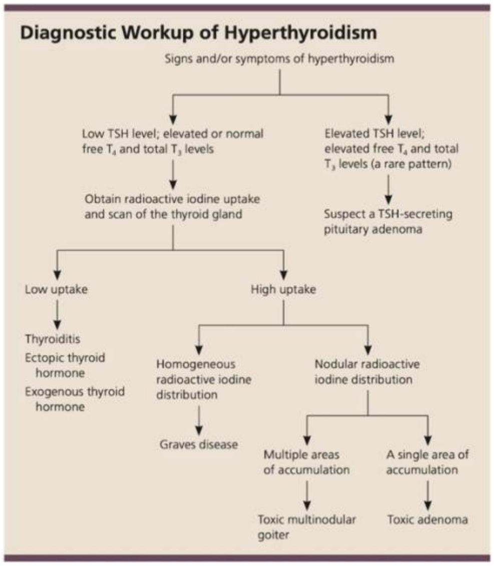
Treatment:

- Adrenergic symptoms are controlled by beta blockers.
- anti-thyroid: PTU, methimazole
- Radioactive iodine ablation
- thyroidectomy



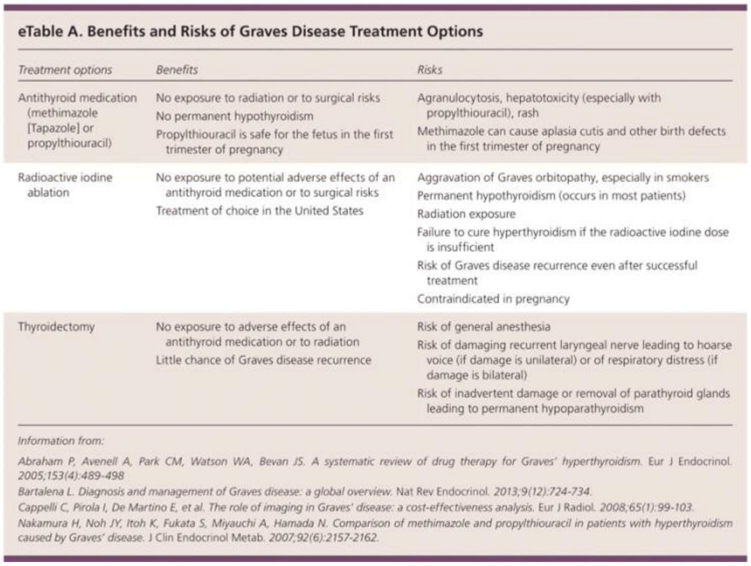
Specific Thyroid Autoantibodies

Antibody test	Disease
Thyroid-stimulating immunoglobulin	Graves disease
Serum thyroglobulin	Subacute thyroiditis
Antithyroperoxidase antibody	Hashimoto thyroiditis



Diagnostic Workup of Hyperthyroidism

Signs and/or symptoms of hyperthyroidism
Low TSH level; elevated or normal free T_4 and total T_3 levels
Elevated TSH level; elevated free T_4 and total T_3 levels (a rare pattern)
Obtain radioactive iodine uptake and scan of the thyroid gland
Suspect a TSH-secreting pituitary adenoma
Low uptake
High uptake
Thyroiditis
Ectopic thyroid hormone
Exogenous thyroid hormone
Homogeneous radioactive iodine distribution
Nodular radioactive iodine distribution
Graves disease
Multiple areas of accumulation
A single area of accumulation
Toxic multinodular goiter
Toxic adenoma



eTable A. Benefits and Risks of Graves Disease Treatment Options

Treatment options	*Benefits*	*Risks*
Antithyroid medication (methimazole [Tapazole] or propylthiouracil)	No exposure to radiation or to surgical risks No permanent hypothyroidism Propylthiouracil is safe for the fetus in the first trimester of pregnancy	Agranulocytosis, hepatotoxicity (especially with propylthiouracil), rash Methimazole can cause aplasia cutis and other birth defects in the first trimester of pregnancy
Radioactive iodine ablation	No exposure to potential adverse effects of an antithyroid medication or to surgical risks Treatment of choice in the United States	Aggravation of Graves orbitopathy, especially in smokers Permanent hypothyroidism (occurs in most patients) Radiation exposure Failure to cure hyperthyroidism if the radioactive iodine dose is insufficient Risk of Graves disease recurrence even after successful treatment Contraindicated in pregnancy
Thyroidectomy	No exposure to adverse effects of an antithyroid medication or to radiation Little chance of Graves disease recurrence	Risk of general anesthesia Risk of damaging recurrent laryngeal nerve leading to hoarse voice (if damage is unilateral) or of respiratory distress (if damage is bilateral) Risk of inadvertent damage or removal of parathyroid glands leading to permanent hypoparathyroidism

Information from:

Abraham P, Avenell A, Park CM, Watson WA, Bevan JS. A systematic review of drug therapy for Graves' hyperthyroidism. Eur J Endocrinol. *2005;153(4):489-498*

Bartalena L. Diagnosis and management of Graves disease: a global overview. Nat Rev Endocrinol. *2013;9(12):724-734.*

Cappelli C, Pirola I, De Martino E, et al. The role of imaging in Graves' disease: a cost-effectiveness analysis. Eur J Radiol. *2008;65(1):99-103.*

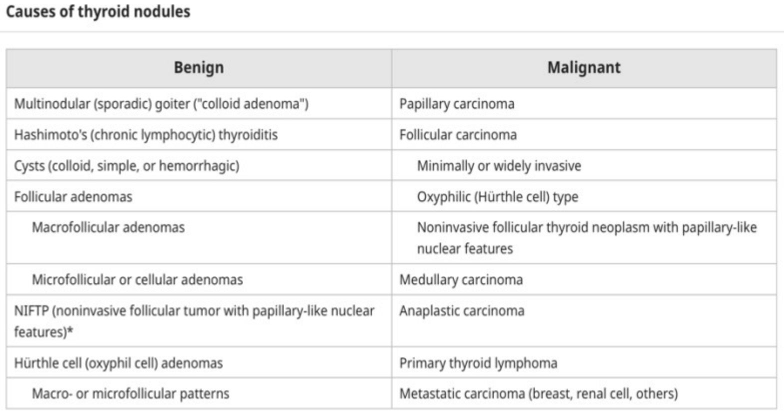
Nakamura H, Noh JY, Itoh K, Fukata S, Miyauchi A, Hamada N. Comparison of methimazole and propylthiouracil in patients with hyperthyroidism caused by Graves' disease. J Clin Endocrinol Metab. *2007;92(6):2157-2162.*

Thyroid Nodules

- Most thyroid nodules (90% to 95%) are benign.
- clinically apparent thyroid nodules were present in 6.4 percent of women and 1.5 percent of men.
- The clinical importance of evaluation is to exclude thyroid cancer, which is present in 4 to 6.5 percent of thyroid nodules.
- **Recommendation: Do not use nuclear medicine thyroid scans to evaluate thyroid nodules in patients with normal thyroid gland function. (Society of Nuclear Medicine and Molecular Imaging)**

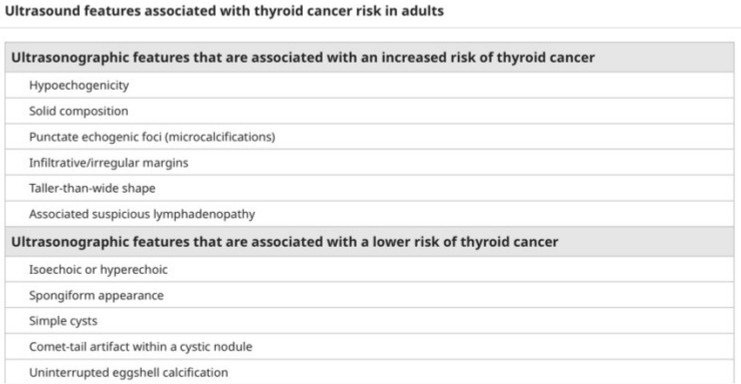
The prevalence of cancer is higher in several groups:

- Children.
- Adults less than 30 years of age.
- Patients with a history of head and neck irradiation.
- Patients with a family history of thyroid cancer.



Causes of thyroid nodules

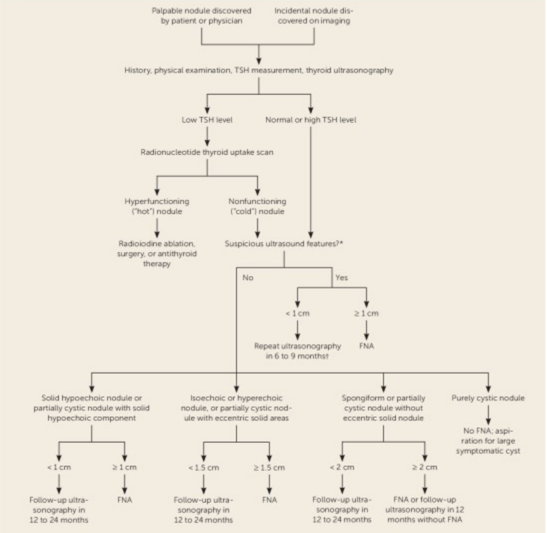
Benign	Malignant
Multinodular (sporadic) goiter ("colloid adenoma")	Papillary carcinoma
Hashimoto's (chronic lymphocytic) thyroiditis	Follicular carcinoma
Cysts (colloid, simple, or hemorrhagic)	Minimally or widely invasive
Follicular adenomas	Oxyphilic (Hürthle cell) type
Macrofollicular adenomas	Noninvasive follicular thyroid neoplasm with papillary-like nuclear features
Microfollicular or cellular adenomas	Medullary carcinoma
NIFTP (noninvasive follicular tumor with papillary-like nuclear features)*	Anaplastic carcinoma
Hürthle cell (oxyphil cell) adenomas	Primary thyroid lymphoma
Macro- or microfollicular patterns	Metastatic carcinoma (breast, renal cell, others)



Ultrasound features associated with thyroid cancer risk in adults

Ultrasonographic features that are associated with an increased risk of thyroid cancer
Hypoechogenicity
Solid composition
Punctate echogenic foci (microcalcifications)
Infiltrative/irregular margins
Taller-than-wide shape
Associated suspicious lymphadenopathy
Ultrasonographic features that are associated with a lower risk of thyroid cancer
Isoechoic or hyperechoic
Spongiform appearance
Simple cysts
Comet-tail artifact within a cystic nodule
Uninterrupted eggshell calcification

FIGURE 1



Palpable nodule discovered by patient or physician
Incidental nodule discovered on imaging
History, physical examination, TSH measurement, thyroid ultrasonography
Low TSH level
Normal or high TSH level
Radionucleotide thyroid uptake scan
Hyperfunctioning ("hot") nodule
Nonfunctioning ("cold") nodule
Radioiodine ablation, surgery, or antithyroid therapy
Suspicious ultrasound features?*
No
Yes
< 1 cm
≥ 1 cm
Repeat ultrasonography in 6 to 9 months†
FNA
Solid hypoechoic nodule or partially cystic nodule with solid hypoechoic component
Isoechoic or hyperechoic nodule, or partially cystic nodule with eccentric solid areas
Spongiform or partially cystic nodule without eccentric solid nodule
Purely cystic nodule
No FNA; aspiration for large symptomatic cyst
< 1 cm
≥ 1 cm
< 1.5 cm
≥ 1.5 cm
< 2 cm
≥ 2 cm
Follow-up ultrasonography in 12 to 24 months
FNA
Follow-up ultrasonography in 12 to 24 months
FNA
Follow-up ultrasonography in 12 to 24 months
FNA or follow-up ultrasonography in 12 months without FNA

FNA = fine-needle aspiration; TSH = thyroid-stimulating hormone.

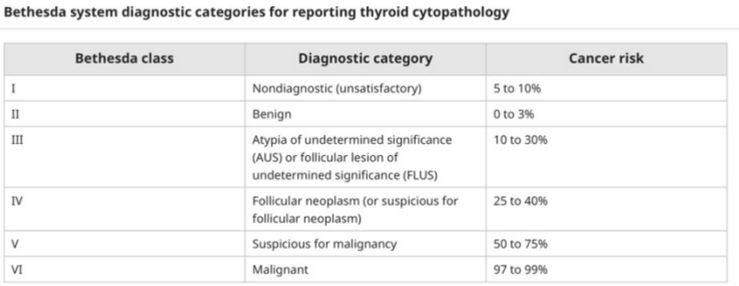
*—Irregular margins, microcalcifications, nodule taller than wide, extrathyroidal extension, disrupted rim calcification, or cervical lymphadenopathy.
†—Except when ultrasonography shows extrathyroid extension or cervical lymphadenopathy, in which case FNA should be performed. FNA can be considered for younger patients or if the patient requests it.

Practical diagnostic approach for thyroid nodules.

Information from reference 11.

Management

- **Nondiagnostic (Bethesda I)**
    - Cytologically inadequate.
    - Repeat the FNA in approximately 4-6 weeks, using ultrasound guidance if not used for the first FNA.
    - If repeated ultrasound-guided aspirations are nondiagnostic, ultrasound-guided core-needle biopsy should be considered.
    - **Benign nodules (Bethesda II)**
- Followed without surgery.
    - Ultrasound 12-24 months initially then 2-5 years if the nodule is small and has benign features.
    - Repeat FNA within 12 months if the nodule has highly supecious ultrasound features despite a benign biopsy.
- **Suspicious for malignancy (Bethesda V), Malignant (Bethesda VI)**
    - Refer to surgery.



Bethesda system diagnostic categories for reporting thyroid cytopathology

Bethesda class	Diagnostic category	Cancer risk
I	Nondiagnostic (unsatisfactory)	5 to 10%
II	Benign	0 to 3%
III	Atypia of undetermined significance (AUS) or follicular lesion of undetermined significance (FLUS)	10 to 30%
IV	Follicular neoplasm (or suspicious for follicular neoplasm)	25 to 40%
V	Suspicious for malignancy	50 to 75%
VI	Malignant	97 to 99%

Hyperparathyroidism

Primary hyperparathyroidism:

- the most common cause of hypercalcemia in outpatients, is often discovered incidentally during evaluation of serum electrolyte levels.

- Most patients today are asymptomatic, but it's important to be aware that subtle and nonspecific symptoms may be present.

Risk factors for primary hyperparathyroidism:

- history of neck radiation
- age older than 50 years
- female sex; women are twice as likely as men to develop primary hyperparathyroidism.

Etiology:

- single adenoma (85%)
- Multiglandular hyperplasia (10% to 15%)
- carcinoma (1% or less)
- Other uncommon familial causes, such as MEN-1 and MEN-2A;
  persons with these conditions may have parathyroid adenomas or asymmetric hyperplasia.

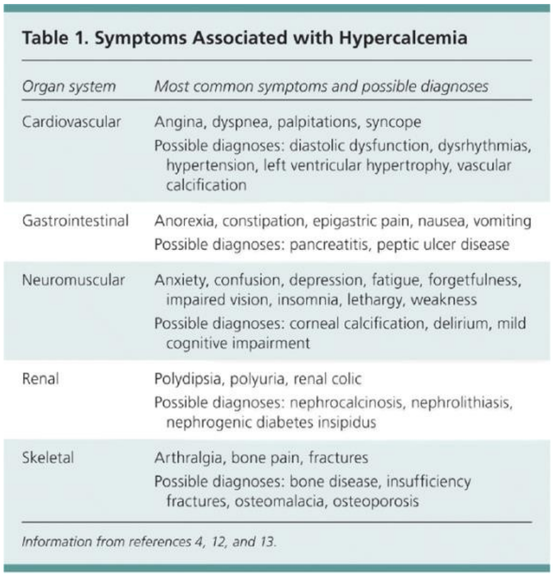


Table 1. Symptoms Associated with Hypercalcemia

Organ system	*Most common symptoms and possible diagnoses*
Cardiovascular	Angina, dyspnea, palpitations, syncope Possible diagnoses: diastolic dysfunction, dysrhythmias, hypertension, left ventricular hypertrophy, vascular calcification
Gastrointestinal	Anorexia, constipation, epigastric pain, nausea, vomiting Possible diagnoses: pancreatitis, peptic ulcer disease
Neuromuscular	Anxiety, confusion, depression, fatigue, forgetfulness, impaired vision, insomnia, lethargy, weakness Possible diagnoses: corneal calcification, delirium, mild cognitive impairment
Renal	Polydipsia, polyuria, renal colic Possible diagnoses: nephrocalcinosis, nephrolithiasis, nephrogenic diabetes insipidus
Skeletal	Arthralgia, bone pain, fractures Possible diagnoses: bone disease, insufficiency fractures, osteomalacia, osteoporosis

Information from references 4, 12, and 13.

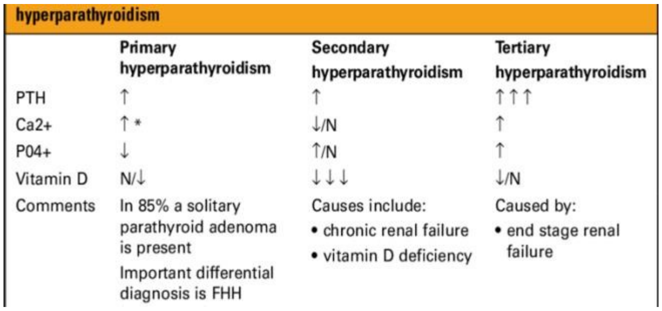
Treatment:

Medical:

- In some patients, medical comorbidities may preclude surgery, and controlling hypercalcemia alone may be the goal.
- the calcimimetic cinacalcet (Sensipar) effectively lowers serum calcium levels, but does not affect bone density.

Surgical:

- symptomatic primary hyperparathyroidism should undergo surgical removal of their parathyroid gland(s).
- asymptomatic patients should undergo parathyroidectomy if they were diagnosed with primary hyperparathyroidism and have one of the following:
  - Serum calcium level greater than 1.0 mg per dL (0.25 mmol per L) above the upper limit of normal
  - Creatinine clearance less than 60 mL per minute per 1.73 m^2 (1 mL per second per m^2)
  - Osteoporosis (T-score of less than −2.5) in any one of three sites (i.e., hip, spine, or wrist) and/or any previous fragility fracture (z scores should be used in premenopausal women and in men younger than 50 years)
  - Age younger than 50 years
- If patients with primary hyperparathyroidism do not undergo parathyroidectomy, they should be closely monitored for the development of symptoms or other indications for surgery. These patients should have serum calcium and creatinine levels measured annually, and three-site (i.e., hip, spine, and forearm) bone density measurement every one to two years



hyperparathyroidism

	Primary hyperparathyroidism	Secondary hyperparathyroidism	Tertiary hyperparathyroidism
PTH	↑	↑	↑↑↑
Ca2+	↑ *	↓/N	↑
P04+	↓	↑/N	↑
Vitamin D	N/↓	↓↓↓	↓/N
Comments	In 85% a solitary parathyroid adenoma is present Important differential diagnosis is FHH	Causes include: • chronic renal failure • vitamin D deficiency	Caused by: • end stage renal failure

Secondary hyperparathyroidism:

Etiology:

- decreased levels of 1,25-dihydroxyvitamin D,
- hyperphosphatemia
- hypocalcemia in the setting of chronic kidney disease
- vitamin D deficiency secondary to low dietary intake
- lack of sun exposure
- malabsorption
- liver disease
- In some patients with advanced renal failure, hypercalcemia is due to progression from appropriate parathyroid hyperplasia to autonomous overproduction of PTH, a disorder termed tertiary hyperparathyroidism.
- Patients with normocalcemic hyperparathyroidism may present with low bone density, osteoporosis, or a fragility fracture. Many of these patients will probably evolve into having hyperparathyroidism, although the exact natural history is not known. It is important to exclude vitamin D deficiency and chronic kidney disease before making this diagnosis.

Treatment:

The management of secondary hyperparathyroidism in chronic kidney disease usually involves consultation with a nephrologist. Protein restriction and calcium supplementation have been shown to decrease the development of this complication, with a reduction in death from renal causes. Vitamin D supplements and calcimimetics, which inhibit PTH secretion, have been shown to improve biochemical markers (without patient-oriented outcomes).

Hypoparathyroidism

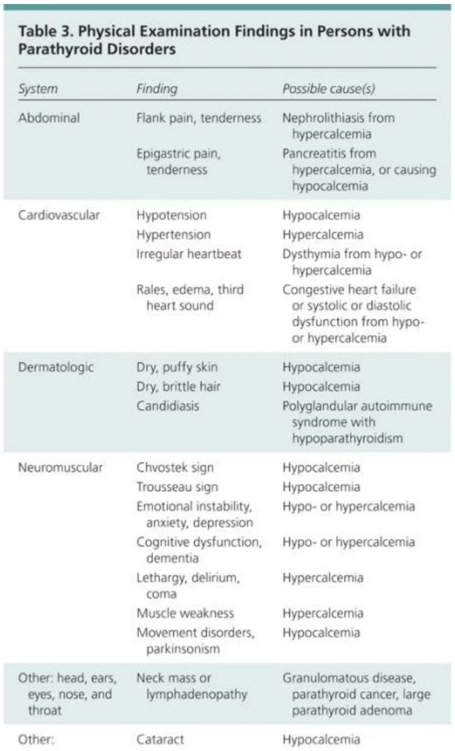


Table 3. Physical Examination Findings in Persons with Parathyroid Disorders

System	*Finding*	*Possible cause(s)*
Abdominal	Flank pain, tenderness	Nephrolithiasis from hypercalcemia
	Epigastric pain, tenderness	Pancreatitis from hypercalcemia, or causing hypocalcemia
Cardiovascular	Hypotension	Hypocalcemia
	Hypertension	Hypercalcemia
	Irregular heartbeat	Dysthymia from hypo- or hypercalcemia
	Rales, edema, third heart sound	Congestive heart failure or systolic or diastolic dysfunction from hypo- or hypercalcemia
Dermatologic	Dry, puffy skin	Hypocalcemia
	Dry, brittle hair	Hypocalcemia
	Candidiasis	Polyglandular autoimmune syndrome with hypoparathyroidism
Neuromuscular	Chvostek sign	Hypocalcemia
	Trousseau sign	Hypocalcemia
	Emotional instability, anxiety, depression	Hypo- or hypercalcemia
	Cognitive dysfunction, dementia	Hypo- or hypercalcemia
	Lethargy, delirium, coma	Hypercalcemia
	Muscle weakness	Hypercalcemia
	Movement disorders, parkinsonism	Hypocalcemia
Other: head, ears, eyes, nose, and throat	Neck mass or lymphadenopathy	Granulomatous disease, parathyroid cancer, large parathyroid adenoma
Other:	Cataract	Hypocalcemia

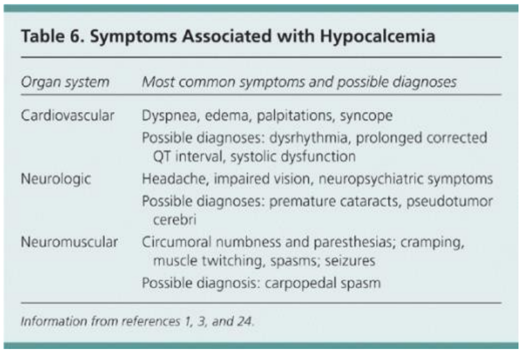


Table 6. Symptoms Associated with Hypocalcemia

Organ system	*Most common symptoms and possible diagnoses*
Cardiovascular	Dyspnea, edema, palpitations, syncope
	Possible diagnoses: dysrhythmia, prolonged corrected QT interval, systolic dysfunction
Neurologic	Headache, impaired vision, neuropsychiatric symptoms
	Possible diagnoses: premature cataracts, pseudotumor cerebri
Neuromuscular	Circumoral numbness and paresthesias; cramping, muscle twitching, spasms; seizures
	Possible diagnosis: carpopedal spasm

Information from references 1, 3, and 24.

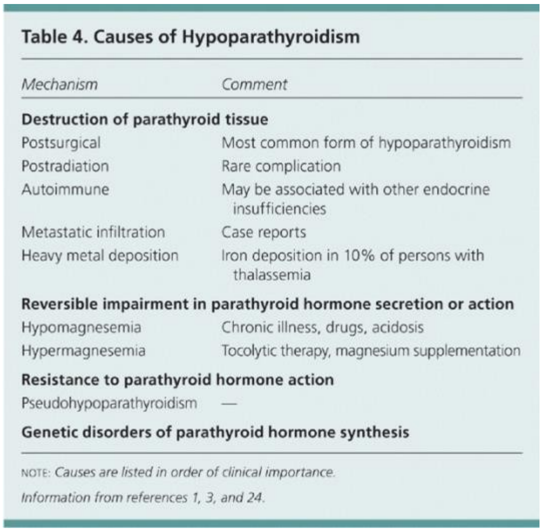


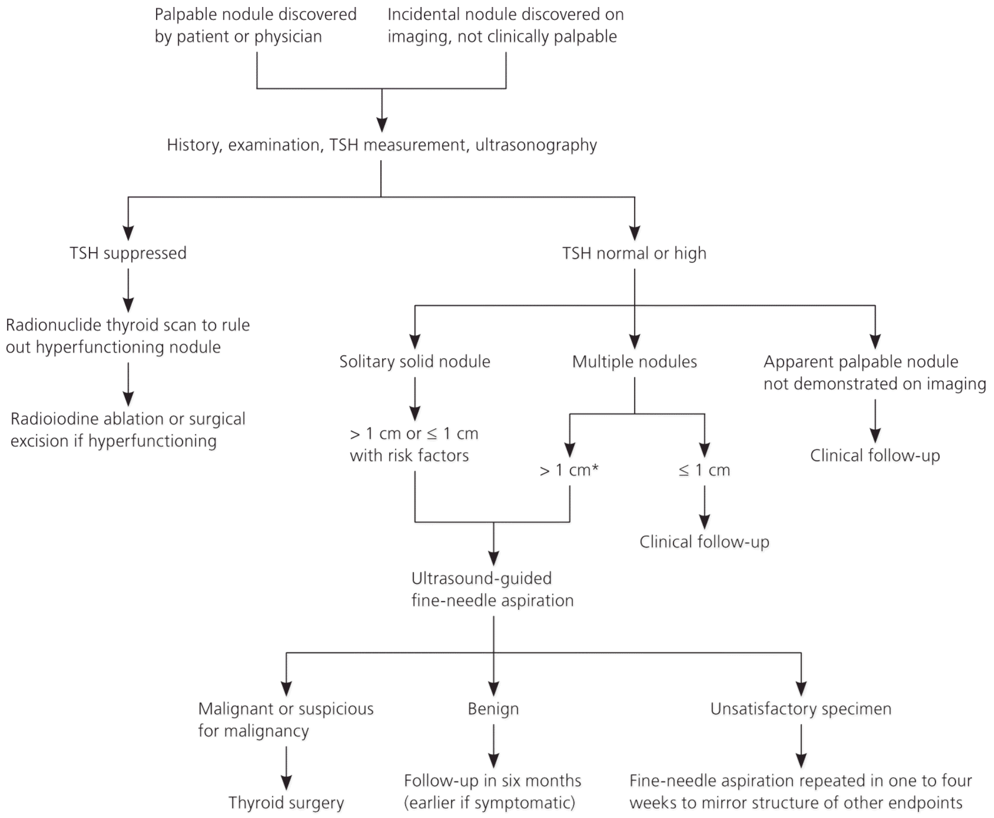
Table 4. Causes of Hypoparathyroidism

Mechanism	*Comment*
Destruction of parathyroid tissue	
Postsurgical	Most common form of hypoparathyroidism
Postradiation	Rare complication
Autoimmune	May be associated with other endocrine insufficiencies
Metastatic infiltration	Case reports
Heavy metal deposition	Iron deposition in 10% of persons with thalassemia
Reversible impairment in parathyroid hormone secretion or action	
Hypomagnesemia	Chronic illness, drugs, acidosis
Hypermagnesemia	Tocolytic therapy, magnesium supplementation
Resistance to parathyroid hormone action	
Pseudohypoparathyroidism	—
Genetic disorders of parathyroid hormone synthesis	

NOTE: *Causes are listed in order of clinical importance.*

Information from references 1, 3, and 24.

Thyroid nodule approach


Palpable nodule discovered by patient or physician
Incidental nodule discovered on imaging, not clinically palpable
History, examination, TSH measurement, ultrasonography
TSH suppressed
TSH normal or high
Radionuclide thyroid scan to rule out hyperfunctioning nodule
Radioiodine ablation or surgical excision if hyperfunctioning
Solitary solid nodule
Multiple nodules
Apparent palpable nodule not demonstrated on imaging
> 1 cm or ≤ 1 cm with risk factors
> 1 cm*
≤ 1 cm
Clinical follow-up
Clinical follow-up
Ultrasound-guided fine-needle aspiration
Malignant or suspicious for malignancy
Benign
Unsatisfactory specimen
Thyroid surgery
Follow-up in six months (earlier if symptomatic)
Fine-needle aspiration repeated in one to four weeks to mirror structure of other endpoints

**—Cutoff size for biopsy with multiple nodules not clearly established.*

Thyroid Disorders
MCQs

ABFM 2022

Which one of the following cardiovascular medications may lead to hyperthyroidism?

A. Amiodarone
B. Digoxin
C. Flecainide
D. Metoprolol
E. Valsartan (Diovan)

ANSWER: A

Amiodarone-induced thyrotoxicosis (AIT) is a less common cause of hyperthyroidism and can be particularly difficult to accurately diagnose and treat. AIT type 1 is a form of iodine-induced thyrotoxicosis caused by the high iodine content in amiodarone. AIT type 2 is a form of amiodarone-induced thyroiditis. Digoxin, flecainide, metoprolol, and valsartan do not cause hyperthyroidism.

A 35-year-old female presents to your office with a feeling of vague fullness in her neck for the last month. She has noticed a gradual onset of fatigue, constipation, and cold intolerance over that time. A few weeks ago the patient took a selfie and was surprised by how puffy her face appeared in the photo. On examination her thyroid is diffusely enlarged and nontender and feels pebbly on palpation. An HEENT examination, including an eye examination, is otherwise normal.

Which one of the following is the most likely diagnosis?

A. Chronic autoimmune (Hashimoto) thyroiditis
B. Graves disease
C. Lymphadenitis
D. Lymphoma
E. Thyroid cancer

ANSWER: A

This patient's clinical picture is most consistent with chronic autoimmune thyroiditis, traditionally known as Hashimoto thyroiditis. This diagnosis is suggested by her neck fullness and symptoms of hypothyroidism. Additionally, a nontender goiter that feels like pebbles on examination is classically reported with chronic autoimmune thyroiditis.

Graves disease typically presents with symptoms of hyperthyroidism and, in many patients, orbitopathy (eye bulging). A patient with lymphadenitis typically shows symptoms of a causative infection. Lymphadenitis tends to rapidly enlarge the lymph nodes, which are also typically painful and tender. Lymphoma more commonly presents with fevers, night sweats, unintentional weight loss, itchy skin, and dyspnea.

This patient lacks a discrete thyroid nodule, which makes thyroid cancer less likely. Thyroid nodules are more frequently painful, while the neck fullness in chronic autoimmune thyroiditis is usually painless and nontender.

A 70-year-old female presents to your office to discuss osteoporosis that was noted on a recent bone density test. Initial laboratory studies reveal an abnormal TSH level of 0.27 µU/mL (N 0.36–3.74). Additional studies reveal the following:

Repeat TSH	0.04 µU/mL
Free T 3	3.4 pg/mL (N 1.7–5.2)
Free T 4	1.4 ng/dL (N 0.7–1.6)

A radioactive iodine uptake scan is notable for multiple areas of increased and suppressed uptake.
Which one of the following is the most likely explanation for these findings?

A. Exogenous thyroid hormone use
B. Graves disease
C. Painless thyroiditis
D. Recent excess iodine intake
E. Toxic multinodular goiter

ANSWER: E
This patient has a low serum TSH level in the presence of normal free T 4 and total or free T 3 levels, which is consistent with subclinical hyperthyroidism. The etiology of overt and subclinical hyperthyroidism should be determined by clinical symptoms, biochemical markers, and, if indicated, diagnostic studies such as a radioactive iodine uptake (RAIU) scan. A scan that shows multiple areas of increased and suppressed uptake is consistent with toxic multinodular goiter. There is no RAIU with exogenous ingestion of thyroid hormone, painless thyroiditis, and recent excess iodine intake. Graves disease causes diffuse RAIU.
It is important to determine the etiology of subclinical hyperthyroidism in order to treat it appropriately. In patients who have TSH levels that are persistently <0.1 U/mL, the American Thyroid Association has a strong recommendation with moderate-quality evidence for treating patients 65 years of age and older; persons with cardiac risk factors, heart disease, or osteoporosis; postmenopausal women not on estrogens or bisphosphonates; and those with hyperthyroid symptoms.

A 27-year-old female with hypothyroidism presents to your clinic at 5 weeks gestation. Her current medications include levothyroxine (Synthroid), 100 µg daily, and a prenatal vitamin. She had a normal TSH level 3 months ago. She is very concerned about the negative effects of medication during pregnancy and asks if she should continue taking levothyroxine.
Which one of the following would be most appropriate for this patient at this time?

A. Continuing the current levothyroxine dosage and referring her to an endocrinologist
B. Increasing the levothyroxine dosage by 30% by taking an extra dose twice weekly
C. Checking her TSH level today and increasing the levothyroxine dosage by 12.5 µg daily if it is >2.5 µU/mL
D. Discontinuing levothyroxine and checking her TSH and free T 4 levels in 6 weeks

ANSWER: B

Pregnant patients with hypothyroidism require increased dosages of levothyroxine as early as the first 4 weeks of pregnancy. General recommendations advise taking an extra dose 2 days per week for a total of 9 weekly doses, which is roughly a 30% increase. The TSH level should be monitored every 4 weeks during pregnancy, and the levothyroxine dosage should be titrated to the pregnancy-specific reference range, which is generally lower than the normal reference range. Referral to an endocrinologist to manage fluctuating levels should be considered. Untreated hypothyroidism can lead to adverse pregnancy outcomes including spontaneous abortion, preterm birth, preeclampsia, and placental abruption.

A 20-year-old female comes to your office for routine follow-up after recently finishing neck irradiation treatment for Hodgkin's lymphoma. Her past medical history is otherwise significant for allergic rhinitis and GERD. She feels generally well after treatment. A physical examination is unremarkable.
Which one of the following should be performed to monitor for complications from radiation?

A. No routine follow-up surveillance
B. Parathyroid hormone levels
C. Swallow studies
D. Carotid artery ultrasonography
E. Neck CT

ANSWER: D

Patients who have been treated with neck irradiation for lymphoma require follow-up surveillance with carotid artery ultrasonography every 10 years. There is evidence that asymptomatic carotid artery disease is more common in patients who have been treated with radiation for Hodgkin's lymphoma compared to the general population. The risk of thyroid cancer is increased by neck irradiation. Hypothyroidism is also a common complication from neck irradiation, and a TSH level should be measured annually for up to 5 years. For patients who have completed treatment for lymphoma, additional surveillance laboratory studies include a comprehensive metabolic panel, fasting glucose level, and CBC. Patients with a history of chest or axillary irradiation should receive annual mammography screening starting 8–10 years after treatment or at age 40, whichever comes first. Breast MRI may be appropriate for patients who received chest irradiation treatment between ages 10 and 30. Parathyroid hormone levels, swallow studies, and neck CT would not be appropriate for this patient as surveillance to monitor for complications from radiation.

A 40-year-old female sees you to discuss a thyroid nodule that was noted on a report from carotid ultrasonography performed by an independent organization. The patient is asymptomatic. Her family history is negative for malignancy. On physical examination you confirm the presence of a thyroid nodule. The remainder of the examination, including the lymphatic system, is negative. A TSH level is normal.
Which one of the following would be the most appropriate next step?

A. Observation only
B. Thyroid ultrasonography
C. A radionucleotide thyroid uptake scan

D. Fine-needle aspiration only
E. Fine-needle aspiration with molecular testing

ANSWER: B

The first step in the evaluation of a palpable thyroid nodule is to obtain a TSH level and perform thyroid ultrasonography (SOR C). If the TSH level is low, a radionucleotide thyroid uptake scan is the appropriate next step to assess for a hyperfunctioning nodule. If the TSH level is normal or high, next steps are determined by the size and characteristics of the thyroid nodule on ultrasonography. Fine-needle aspiration (FNA) may be indicated depending on the size and nodule characteristics. Molecular testing of FNA specimens is useful in order to guide management of thyroid nodules with indeterminate cytology. Before molecular testing is performed, patients should be counseled about the potential benefits and limitations of the test (SOR C).
Observation only would not be appropriate in this scenario.

Promotion 2022

Pregnant lady first visit with hypothyroidism on Levothyroxine 50 micrograms. What is the next thing to do?

A. Repeat TSH
B. Increase dose to 75 mcg
C. Stop Levothyroxine

Answer: B

Maternal hypothyroidism can have serious effects on the fetus, so thyroid dysfunction should be treated during pregnancy. Because of hormonal and metabolic changes in early pregnancy, the levothyroxine dosage often needs to be increased at 4–6 weeks gestation, and the patient eventually may require a 30%– 50% increase in dosage in order to maintain her euthyroid status.

Typical scenario of recurrent headaches and palpitations. She’s also c/o visual disturbance, weight loss. On exam, diffuse symmetrical nontender thyroid enlargement. Labs: high TSH and high T4 / T3. What is the most likely diagnosis?

A. Graves’ disease
B. Hashimoto thyroiditis
C. TSH-production pituitary adenoma
D. Hidden thyroxine use

Answer: C

A TSH-secreting pituitary adenoma results in elevated TSH, free T4, and total T3.

Lady with hypothyroidism symptoms (they didn't mention the dx in the Q) What is associated with this condition?

A. DLP
B. HTN
C. DM
D. hypoparathyroid

Answer: A

Hypothyroidism is frequently associated with and is a common cause of hyperlipidemia. Thus, serum thyrotropin should be measured in all patients with dyslipidemia. Reversal of the hypothyroidism with thyroid hormone replacement leads to correction of the hyperlipidemia.

Case of subclinical hypothyroidism symptomatic TSH: 10 with + TPO antibodies and symptomatic (low mood – dry skin – fatigue) What is the next step?

A. treat with levothyroxine 50 mcg
B. repeat labs after 8 weeks
C. treat with T3
D. SSRI

Answer: A

Approach to treatment is based on patient age, degree of TSH elevation, and the presence or absence of symptoms. For patients with subclinical hypothyroidism and TSH concentrations ≥10 mU/L, we suggest treatment with thyroid hormone

Pregnant lady at 20-week gestation with thyroid nodule 2 cm. Nodule has irregular margins, and microcalcifications, what's next?

A. Waite until delivery
B. Thyroid scan
C. Fine Needle Aspiration

Answer: C

Recent recommendations are to biopsy only those larger than 1 cm (or less if there are risk factors). If a larger nodule is found, the next step is fine- needle aspiration (FNA). Nodules 1 cm or smaller may be followed with serial ultrasonography. More than one nodule should be biopsied if multiple nodules are found on ultrasonography. Thyroid radionuclide scanning is contraindicated during pregnancy. Otherwise, a pregnant woman found to have a thyroid nodule can be evaluated in the same way as if she were not pregnant.

Typical scenario of Graves' disease picture of exophalmus asking about investigation?

Answer: Thyroid functions

Clinical suspicion of hyperthyroidism should prompt laboratory testing. physicians first order a TSH test, and then subsequently obtain free thyroxine (T4) and total triiodothyronine (T3) levels. The serum level of thyroid- stimulating immunoglobulins or TSH-receptor antibodies helps distinguish Graves disease from other causes of hyperthyroidism in patients who lack signs pathognomonic of Graves disease and have a contraindication to radioactive iodine uptake and scan.

Part 1 and 2 2022

Patient came with fatigue, weight gain, edema and constipation. Labs showed high TSH, high Prolactin and high lipid profile. (T4 was not mentioned). What is the most appropriate next step?

A. levothyroxine
B. Bromocriptine
C. Statin

Answer: A

This is a case of primary hypothyroidism. The diagnosis of hypothyroidism is based primarily upon laboratory testing: ↑TSH, ↓T4 (Primary), ↓TSH, ↓T4 (central). Other labs seen in hypothyroidism include Elevated CRP, Hyperprolactinemia, Hyponatremia, Increased creatine kinase, Increased LDL, Increased triglycerides, Proteinuria, Normocytic anemia. Reversal of the hypothyroidism with thyroid hormone replacement leads to correction of the hyperlipidemia.

Patient came with painless irregular nodule in right side of the neck, slow in progression, moving with swallowing about 2cm. Labs showed normal TSH. What is the next step?

A. Nuclear scan
B. Excisional biopsy
C. FNA
D. CT

Answer: C

Recent recommendations are to biopsy only those larger than 1 cm (or less if there are risk factors). If a larger nodule is found, the next step is fine- needle aspiration (FNA). Nodules 1 cm or smaller may be followed with serial ultrasonography. More than one nodule should be biopsied if multiple nodules are found on ultrasonography.

Patient came with signs of hyperthyroidism. On examination enlarged tender thyroid. Labs showed decrease iodine uptake < 1% What to do next?

A. TSI (thyroid stimulating immunoglobulin)
B. NSAID and Glucocorticoid
C. Carbamazepine
D. Thyroglobulin antibodies

Answer: B
This patient has signs and symptoms of painful subacute thyroiditis, including a painful thyroid gland, hypothyroidism, and an elevated erythrocyte sedimentation rate. It is unclear whether there is a viral etiologic to this self-limited disorder. Thyroid function returns to normal in most patients after several weeks and may be followed by a temporary hypothyroid state. Treatment is symptomatic. Although NSAIDs can be helpful for mild pain, high-dose glucocorticoids provide quicker relief for the more severe symptoms.

A 50-year-old patient newly diagnosed AF. Examination showed diffuse neck swelling, exophthalmos, and anterior tibial edema with yellow brown pigmentation. Labs showed low TSH and high T4. What is the most appropriate management?

A. Methimazole
B. PTU
C. Total Thyroidectomy or subtotal.
D. Radioactive iodine therapy

Answer: A?
Based on her clinical presentation and classic ophthalmopathy, this patient has Graves' disease. Unlike radioactive iodine, methimazole has been shown to decrease the risk of development or progression of ophthalmopathy in Graves' disease.

A 54-year-old female on α-blocker and another medication, has irregular menses, fatigue + nipple discharge, no visual changes. Labs: TSH: high 14 FT4: low Prolactin: high FSH & LH: normal What is the most likely cause of her problem?

A. Hypothyroid
B. Prolactinoma
C. Side effects of medications

Answer: A.

Hypothyroid = (↑ TSH ± ↓ FT4) & TRH → Prolactin → Galactorrhea

KFMC midyear 2022

Female patient with a history of viral upper respiratory tract infection one month ago, came to the clinic complaining of fever and painful neck swelling. On examination she was febrile and had a tender thyroid on palpation, what is the most likely diagnosis?

A. subacute granulomatous thyroiditis
B. Acute infectious thyroiditis
C. Hypothyroidism
D. Drug induced thyroiditis

Answer: A

Subacute granulomatous thyroiditis is a less common cause of transient hyperthyroidism. It is presumably triggered by a viral infection or a post-viral inflammatory process, and the resulting thyroid inflammation subsequently leads to unregulated release of large amounts of thyroxine T4 and triiodothyronine T3, and, thus, hyperthyroidism. Incidence is greater in women more than men, and patients tend to present in young adulthood or middle age. Neck pain with or without radiation to jaw, throat, chest, or ears is the most frequent presenting symptom, and the thyroid gland is typically enlarged and tender on palpation. Although clinical signs and symptoms may be sufficient for establishing a diagnosis of subacute thyroiditis, obtaining thyroid function tests can help confirm the diagnosis. TSH is suppressed due to increase concentration of T4 and T3. Of note, the transient hyperthyroidism seen on presentation is typically followed by euthyroidism, then hypothyroidism, and ultimately restoration of normal thyroid function, and each phase typically lasts two to eight weeks. Treatment of patients with subacute thyroiditis is directed towards symptoms management. NSAIDs or prednisone are appropriate for management of thyroid pain and tenderness. Pharmacologic therapies to treat hyperthyroidism and hypothyroidism are typically not needed because associated symptoms, if present, are mild and transitory; however, particularly symptomatic hyperthyroid patients may be managed for a few weeks with beta-blockers, and patients with more pronounced hypothyroidism symptoms may be treated for six to eight weeks with levothyroxine.

s

A 50-year-old female sees you for a routine health maintenance visit. On examination you note a thyroid nodule and ultrasonography confirms a solid 1.7-cm nodule. Her TSH level is normal. Which one of the following would be the most appropriate next step in the management of this patient?

A. Repeat ultrasonography in 6 months.
B. A fine-needle aspiration biopsy.
C. Surgical excision of the nodule.
D. Antithyroid antibody titers.

Answer: B.

Thyroid nodules more than or equal 1 cm that are solid or have suspicious features require a fine-needle aspiration biopsy to rule out malignancy. Fine-needle aspiration should not be performed on nodules <1 cm. The evaluation of a single thyroid nodule does not call for testing of antithyroid antibody titers. If the patient had a low TSH level, then a radionuclide thyroid uptake scan (nuclear medicine thyroid scan) is indicated to look for a toxic nodule. These hyperfunctioning nodules are seldom malignant. Surgical nodule excision is not indicated since needle aspiration is diagnostic. Repeat ultrasonography in 6 months is not indicated because this would not change management.

A 29-year-old gravida 2 para 1 presents for pregnancy confirmation. Her last menstrual period began 6 weeks ago. Her medical history is significant for hypothyroidism, which has been well-controlled on levothyroxine (Synthroid), 150 mcg daily, for the past 2 years. Which one of the following would be the most appropriate next step in the treatment of this patient's hypothyroidism during her pregnancy?

A. Decrease the levothyroxine dosage.
B. Continue her current regimen.
C. Increase the levothyroxine dosage by 25-50 mcg.
D. Add liothyronine (Cytomel) to her current regimen.

Answer: C.

Maternal hypothyroidism can have serious effects on the fetus, so thyroid dysfunction should be treated during pregnancy. Because of hormonal and metabolic changes in early pregnancy, the levothyroxine dosage often needs to be increased at 4–6 weeks gestation, and the patient eventually may require a 30%– 50% increase in dosage in order to maintain her euthyroid status.

A 45-year-old woman presents to your office for follow-up. She has a long history of hypothyroidism and is taking thyroid replacement therapy. She has been on 50 µg of levothyroxine daily for around 1 year, but reports that she's recently felt fatigued and has gained some weight. You obtain a TSH test, and it comes back high at 7.2 mIU/mL. You decide to increase her dosage of levothyroxine in an attempt to get her euthyroid. When should you recheck the TSH to gauge the new dosage?

A. 2 weeks after the dose adjustment.
B. 6 months after dose adjustment.
C. 6 weeks after dose adjustment.
D. 3 months after dose adjustment.

Answer: C.

Thyroid disorders are common, with hypothyroidism being much more common than hyperthyroidism, nodular disease, or thyroid cancer. The incidence of hypothyroidism is 7% of women and 3% of men aged 60 to 89 years. Once diagnosed, the TSH level is the most important measure to gauge the dose of thyroid replacement therapy. Dose of thyroid replacement therapy will vary depending on age, weight, cardiac status, and severity of the condition. Once therapy is adjusted, a TSH level should be checked in 6 weeks and therapy should be titrated to keep the TSH in the normal range.

A 30-year-old female with hyperthyroidism is treated with methimazole (Tapazole). Which one of the following is a potential adverse reaction?

A. Agranulocytosis.
B. Renal toxicity.
C. Thrombocytopenia.
D. Aplastic anemia.

Answer: A.

Agranulocytosis occurs in about 1 in 500 patients who are taking methimazole. Prior to starting therapy the patient should be advised to be alert for a fever and severe sore throat. A recent survey showed that 61% of patients were unaware of potential adverse reactions. Another serious reaction is hepatotoxicity.

A 29 years old pregnant woman at 8 weeks gestational age is found to have hyperthyroidism. She has been feeling well and appears to be asymptomatic at this time. Which one of the following medications is the drug of choice for the treatment of hyperthyroidism in the first trimester of pregnancy?

A. Propranolol.
B. Methimazole.
C. Propylthiouracil (PTU).
D. Radioactive iodine.

Answer: C?.

A 47-year-old female presents with a 2-month history of generalized left shoulder pain. She does not have any ongoing illnesses. On examination you note generally impaired range of motion in the shoulder, but a radiograph of the shoulder is normal. You diagnose adhesive capsulitis. Which one of the following tests would be most appropriate at this time?

A. Antinuclear antibody.
B. Erythrocyte sedimentation rate.
C. Haemoglobin A1c.
D. IgA tissue transglutaminase.
E. MRI without contrast

Answer C.

Both diabetes mellitus and hypothyroidism have been found to have a prevalence of 25%–50% in patients with adhesive capsulitis, which is also known as frozen shoulder. Consideration should be given to testing for both conditions when making the diagnosis of adhesive capsulitis (level of evidence C). Other laboratory tests such as antinuclear antibody, an erythrocyte sedimentation rate, and IgA tissue transglutaminase are not recommended to add support for the diagnosis of adhesive capsulitis. Adhesive capsulitis is a clinical diagnosis and MRI is reserved to look for other sources of pathology, and not routinely recommended. Plain radiography is reasonable to rule out other conditions such as glenohumeral osteoarthritis.

A 33-year-old female presents with palpitations and excessive sweating. A physical examination is normal. Laboratory findings include a TSH level of 0.02 U/mL (N 0.40–4.00) and a free T4 level of 3.9 ng/dL (N 0.7–1.9). Radionuclide scanning reveals no uptake. Which one of the following would explain these findings?

A. Thyroid hormone resistance.
B. Graves' disease.
C. A toxic nodular goitre.
D. Excess thyroid hormone intake.
E. A thyrotropin-secreting pituitary tumor.

Answer: D.

Excess thyroid hormone intake would cause a low TSH level with a high free T4 level. Other possibilities include an hCG-secreting tumor and the thyrotoxic phase of subacute thyroiditis. An elevated TSH level would be seen with thyroid-hormone resistance or a thyrotropin-secreting pituitary tumor. Graves disease causes a homogeneous increased thyroid uptake on radionuclide scanning, whereas a hot nodule would be expected with toxic nodular goiter.

A 72-year-old female with a history of type 2 diabetes and hypertension presents to your clinic because of fatigue and depression for the last 5–6 months. She has gained about 7 kg (15 lb) and now has a BMI of 32 kg/m2. A physical examination is otherwise unremarkable. Laboratory studies reveal a TSH level of 8.2 U/mL (N 0.4–4.0). A repeat test 1 month later shows a TSH level of 7.4 U/mL and a free T4 level of 1.6 ng/dL (N 0.8–2.8). Treatment of this patient with L-thyroxine

A. Has no proven benefit.
B. Can increase grip strength.
C. Can increase her energy level.
D. Can help improve depression symptoms.
E. Can reduce her BMI.

Answer: A.

Subclinical hypothyroidism (SCH) is defined as an elevation in TSH level with a normal free T4 level. It is relatively common in adults over the age of 65, with a prevalence of 20%. The TRUST (Thyroid Hormone Replacement for Subclinical Hypothyroidism) trial and subsequent meta-analyses of randomized, controlled trials demonstrate that there is no benefit in treating SCH. Symptoms such as muscle strength, fatigue or tiredness, depression, and BMI do not improve with L-thyroxine treatment (SOR A), and up to 60% of cases resolve within 5 years without intervention in older adults. Appropriate management of an elevated TSH level includes repeat testing in 1–3 months along with a free T4 level. If SCH is diagnosed, levels should be monitored yearly. Only 2%–4% of patients with SCH develop overt hypothyroidism.

An asymptomatic 55-year-old female sees you for the first time. She asks for advice about laboratory results from a health maintenance examination performed last month by her previous physician. These results included a TSH level of 0.2 U/mL (N 0.4–4.2). Other laboratory results, including free T4 and free T3 levels, were normal. Her past medical history and a physical examination today, including a thyroid examination, are unremarkable. Which one of the following would you recommend at this time?

A. Observation only.
B. A thyroglobulin levels.
C. Thyroid antibody studies.
D. Thyroid ultrasonography.
E. A thyroid uptake scan with radioactive iodine.

Answer: A.

Approximately 1%–2% of adults will have subclinical hyperthyroidism with a low TSH level and normal T3 and T4 levels. The American Thyroid Association recommends observation for asymptomatic patients with mildly low TSH (0.1–0.4 U/mL), so further evaluation is not indicated in this patient. A thyroglobulin level might be helpful in differentiating exogenous thyroid intake from thyroiditis but would not be appropriate in this case. Further evaluation including thyroid antibody studies and a thyroid uptake scan with radioactive iodine should be considered in older patients (>65 years), those with very low TSH (<0.1 U/mL), and those with comorbidities. Thyroid ultrasonography is not indicated for abnormal thyroid function tests in asymptomatic patients with normal examinations.

Which one of the following is an indication for a radionuclide thyroid uptake scan for a patient with a single thyroid nodule confirmed by ultrasonography?

A. The presence of antithyroid antibodies.
B. A low TSH level.
C. An elevated TSH level.
D. A normal TSH level and a tender nodule.
E. The presence of the thyroid nodule regardless of other findings.

Answer: B.

In all patients found to have a thyroid nodule, the first steps in evaluation should be measuring the TSH level and performing thyroid ultrasonography. If the TSH level is low, then a radionuclide scan is indicated.

If the scan indicates hyperfunctioning of the nodule, then fine-needle aspiration is not necessary and radioactive iodine ablation is generally the treatment of choice. With normal to high TSH levels, the need for a biopsy and for follow-up surveillance depends on the findings on ultrasonography. Measuring antithyroid antibodies in a patient with a thyroid nodule is not part of the routine workup.

What are the expected results of a radioiodine or technetium imaging study in the setting of subacute thyroiditis and hyperthyroidism?

A. Low radioiodine uptake.

Answer: A.

What medication can be used to treat the symptoms of transient hyperthyroidism in subacute thyroiditis?

A. Propranolol.

Answer: A.

A 32-year-old woman with no significant medical history presents to clinic complaining of one week of anterior neck pain, which sometimes radiates to her jaw and ears. She reports associated subjective fevers, tiredness, and muscle aches. She also describes having had symptoms suggestive of an upper respiratory infection prior to onset of neck pain. Pertinent findings on physical exam include diffuse tenderness and slight enlargement of the thyroid gland on palpation. Laboratory examinations and imaging are obtained to help confirm the diagnosis. Which of the following laboratory findings are most likely to be decreased?

A. Erythrocyte sedimentation rate.
B. Free thyroxine.
C. Thyroid-stimulating hormone.
D. Triiodothyronine.

Answer: C.
Explanation Subacute thyroiditis. Also known as subacute granulomatous thyroiditis, is a less common cause of transient hyperthyroidism. It is presumably triggered by a viral infection or a post-viral inflammatory process, and the resulting thyroid inflammation subsequently leads to unregulated release of large amounts of thyroxine T4 and triiodothyronine T3, and, thus, hyperthyroidism. Incidence is greater in women more than men, and patients tend to present in young adulthood or middle age. Neck pain with or without radiation to jaw, throat, chest, or ears is the most frequent presenting symptom, and the thyroid gland is typically enlarged and tender on palpation. Although clinical signs and symptoms may be sufficient for establishing a diagnosis of subacute thyroiditis, obtaining thyroid function tests can help confirm the diagnosis. TSH is suppressed due to increase

concentration of T4 and T3. Of note, the transient hyperthyroidism seen on presentation is typically followed by euthyroidism, then hypothyroidism, and ultimately restoration of normal thyroid function, and each phase typically lasts two to eight weeks. Treatment of patients with subacute thyroiditis is directed towards symptoms management. NSAIDs or prednisone are appropriate for management of thyroid pain and tenderness. Pharmacologic therapies to treat hyperthyroidism and hypothyroidism are typically not needed because associated symptoms, if present, are mild and transitory; however, particularly symptomatic hyperthyroid patients may be managed for a few weeks with beta-blockers, and patients with more pronounced hypothyroidism symptoms may be treated for six to eight weeks with levothyroxine.

Patient came for regular check-up; her lab test shows High TSH and Low T4. What is most common case of for this disease?

A. Hashimoto’s thyroiditis.
B. Gravis disease.
C. Subacute thyroiditis.
D. Iodine deficiency.

Answer: A.
Chronic autoimmune hypothyroidism (Hashimoto's thyroiditis) is the most common cause of primary hypothyroidism in iodine sufficient areas of the world (Which includes Saudi Arabia). In areas with high iodine intake, the incidence of hypothyroidism can be higher than in areas with normal or low iodine intake.

Patient with asymptomatic painless thyroid nodule. His TSH, T4, T3 within normal. U/S show irregular border 2.5 cm nodule with vascularization and microcalcification. What is the next step?

A. FNA.
B. Reassure because a lot of people have thyroid nodule.
C. Radioactive iodine.
D. Reassurance and thyroid US after 6 months.

Answer: A.
Recent recommendations are to biopsy only those larger than 1 cm (or less if there are risk factors). If a larger nodule is found, the next step is fine- needle aspiration (FNA). Nodules 1 cm or smaller may be followed with serial ultrasonography. More than one nodule should be biopsied if multiple nodules are found on ultrasonography.

Female patient with fatigue, constipation, and numbness. lab test shows high parathyroid hormone and high calcium. what is most commonly associated with this disease?

A. Heart failure.
B. Osteoporosis.
C. Hirsutism.
D. Anxiety.

Answer: B.

Osteoporosis is a clinical manifestation of hypercalcemia. Due to high parathyroid hormone and calcium, the patient is suffering from Primary Hyperparathyroidism. Patients with hyperparathyroidism may have decreased bone mineral density (BMD), in particular at more cortical sites (forearm and hip) as compared with more trabecular (cancellous) sites (spine).

A 72-year-old female presents with bothersome palpitations. She is otherwise healthy and is not taking any medications. A physical examination is normal, including thyroid and eye examinations. Laboratory studies reveal a serum TSH level of 0.2 U/mL (N 0.4–4.0) and normal T3 and free T4 levels. An EKG reveals frequent premature atrial contractions but is otherwise normal. Ultrasonography of the thyroid does not reveal any nodules, thyroid scintigraphy shows diffuse uptake, and an anti–thyrotropin-receptor (thyroid-stimulating immunoglobulin) antibody level is significantly elevated. Which one of the following is the most likely diagnosis?

A. Central hypothyroidism.
B. Graves' disease.
C. Iodine deficiency.
D. Solitary toxic thyroid nodule.
E. Toxic multinodular goiter.

Answer: B.

This patient has subclinical hyperthyroidism caused by Graves' disease. A positive anti–thyrotropin-receptor (thyroid-stimulating immunoglobulin) antibody result is virtually diagnostic of Graves' disease. Central hypothyroidism is associated with a low TSH level and low T3 and T4 levels. Iodine deficiency is associated with goiter and hypothyroidism. Nodular thyroid disease is unlikely given the imaging results. Treatment of this patient’s mild Graves’ disease is probably indicated, given her age and cardiac symptoms.

A 34-year-old female comes to your office for follow-up after an emergency department visit because of anxiety. She notes persistent anxiety, poor focus, and palpitations. She also reports that she is not hungry and has lost several pounds. She reports “odd things happening” such as sudden weakness in her legs, falling, and getting lost. When taking her history, you note that the patient is hyperverbal and displays tangential speech. She has a temperature of 37.4°C (99.3°F), a heart rate of 134 beats/min, a respiratory rate of 20/min, and a blood pressure of 117/69 mm Hg. A physical examination reveals an anxious-appearing female who is tremulous at rest. A HEENT examination shows exophthalmos but no thyromegaly. A cardiac examination is unremarkable aside from tachycardia. A pulmonary examination reveals faint bi- basilar crackles. An EKG shows sinus tachycardia. Laboratory results are as follows: CBC: within normal limits. Basic metabolic panel: within normal limits TSH: <0.08 U/mL (N 0.35–3.00) Free T4: 4.51 ng/dL (N 0.89–1.80) Free T3: >19.0 pg/dL (N 2.3–4.2). Which one of the following would be most appropriate at this point?

A. Start methimazole (Tapazole).
B. Check for thyroid receptor antibody.
C. Obtain a radioactive iodine uptake scan.
D. Refer her to endocrinology.
E. Admit her to the hospital.

Answer: E.

Hyperthyroidism is a common condition with a generally favourable prognosis. However, it is important to remember that life-threatening complications such as thyrotoxicosis, also known as thyroid storm, can occur. Symptoms of thyroid storm include fever, central nervous system dysfunction, gastrointestinal or liver dysfunction, and cardiovascular complications such as tachycardia and heart failure. The diagnosis is made using the Burch-Wartofsky Point Scale, which produces a total score based on the presence or absence of various diagnostic criteria. In this case, the patient has a score of 45, which is highly suggestive of thyroid storm. This acute, life-threatening condition typically requires care in an intensive-care unit. It would therefore be inappropriate to start treatment with an agent such as methimazole prior to hospitalization. While a thyroid receptor antibody test may be useful in identifying the cause of the condition it should not delay hospitalization. A radioactive iodine uptake test is also useful for identifying the underlying cause of hyperthyroidism but should be avoided until the thyroid storm has resolved. This patient requires hospitalization, so a referral to endocrinology would not be most appropriate at this time.

A 50-year-old female sees you for a routine health maintenance visit. On examination you note a thyroid nodule and ultrasonography confirms a solid 1.5-cm nodule. Her TSH level is normal. Which one of the following would be the most appropriate next step in the management of this patient?

A. Antithyroid antibody titers.
B. A thyroid scan.
C. A fine-needle aspiration biopsy.
D. Surgical excision of the nodule.
E. Repeat ultrasonography in 6 months.

Answer: C.

Thyroid nodules more than or equal 1 cm that are solid or have suspicious features require a fine-needle aspiration biopsy to rule out malignancy. Fine-needle aspiration should not be performed on nodules <1 cm. The evaluation of a single thyroid nodule does not call for testing of antithyroid antibody titers. If the patient had a low TSH level, then a radionuclide thyroid uptake scan (nuclear medicine thyroid scan) is indicated to look for a toxic nodule. These hyperfunctioning nodules are seldom malignant. Surgical nodule excision is not indicated since needle aspiration is diagnostic. Repeat ultrasonography in 6 months is not indicated because this would not change management.

A 30-year-old gravida 2 para 1 in her second trimester is evaluated for hypothyroidism. The normal TSH range in pregnancy is

A. Lower than in the nonpregnant state.
B. Higher than in the nonpregnant state.
C. The same as in the nonpregnant state.
D. Not useful for evaluating hypothyroidism after the first trimester.

Answer: A.

The TSH reference range is lower during pregnancy because of the cross-reactivity of the -subunit of hCG. Levels of hCG peak during weeks 7–13 of pregnancy, and hCG has mild TSH-like activity, leading to slightly high free T4 levels in early pregnancy. This leads to a feedback decrease in TSH.

A nulliparous 34-year-old female comes to your office for evaluation of fatigue, hair loss, and anterior neck pain. These symptoms have been gradually worsening for the past few months. Her past medical history is unremarkable. She has gained 5 kg (11 lb) since her last office visit 18 months ago. Examination of the thyroid gland reveals tenderness but no discrete nodules. Her TSH level is 7.5 U/mL (N 0.4–4.2), her T4 level is low, and her thyroid peroxidase antibodies are elevated. Which one of the following would be the most appropriate next step?

A. Continue monitoring TSH every 6 months.
B. Begin thyroid hormone replacement and repeat the TSH level in 6–8 weeks.
C. Begin thyroid hormone replacement and repeat the TSH level along with a T3 level in 6–8 weeks.
D. Order ultrasonography of the thyroid.
E. Order fine-needle aspiration of the thyroid.

Answer: B.

This patient has thyroiditis with biochemical evidence for autoimmune (Hashimoto’s) thyroiditis. The most appropriate plan of care is to begin thyroid hormone replacement and monitor with a repeat TSH level 6–8 weeks later. It is not necessary to include a T3 level when assessing the levothyroxine dose. There is no need to routinely order thyroid ultrasonography when there are no palpable nodules on a thyroid examination. Fine- needle aspiration may be necessary to rule out infectious thyroiditis when a patient presents with severe thyroid pain and systemic symptoms.

A 32-year-old female presents with heat intolerance, excessive weight loss, and anxiety. She gave birth 6 months ago and recently stopped breastfeeding. On examination her thyroid gland is slightly diffusely enlarged and nontender. Laboratory studies reveal a decreased TSH level and elevated free T3 and T4 levels. You suspect that she has postpartum thyroiditis. Which one of the following tests would be most useful to confirm the diagnosis?

A. Radioactive iodine uptake.
B. Thyroid peroxidase antibody levels.
C. Thyroid ultrasonography.
D. Thyrotropin receptor antibody levels.

Answer: A.

Postpartum thyroiditis is defined as a transient or persistent thyroid dysfunction that occurs within 1 year of childbirth, miscarriage, or medical abortion. Release of preformed thyroid hormone in the bloodstream initially results in hyperthyroidism. During the hyperthyroid phase, radioactive iodine uptake will be low, which can help to confirm the diagnosis. Pregnancy and breastfeeding are contraindications to radionuclide imaging. Thyroid peroxidase antibody levels are elevated with chronic autoimmune thyroiditis (Hashimoto’s thyroiditis), and patients present with symptoms of hypothyroidism. The Endocrine Society and American Association of Clinical Endocrinologists do not recommend routine thyroid ultrasonography in patients with abnormal thyroid function tests if there is no palpable abnormality of the thyroid gland. Thyrotropin receptor antibody levels are positive in Graves' disease.

A 42-year-old male presents with anterior neck pain. His thyroid gland is markedly tender on examination, but there is no overlying erythema. He also has a bilateral hand tremor. His erythrocyte sedimentation rate is 82 mm/hr (N 1–13) and his WBC count is 11,500/mm (N 3 4300–10,800). His free T4 is elevated, TSH is suppressed, and radioactive iodine uptake is abnormally low. Which one of the following treatment options would be most helpful at this time?

A. Levothyroxine (Synthroid) and NSAIDs.
B. Propylthiouracil.
C. Prednisone.
D. Nafcillin.
E. Thyroidectomy.

Answer: C.

This patient has signs and symptoms of painful subacute thyroiditis, including a painful thyroid gland, hypothyroidism, and an elevated erythrocyte sedimentation rate. It is unclear whether there is a viral etiologic to this self-limited disorder. Thyroid function returns to normal in most patients after several weeks and may be followed by a temporary hypothyroid state. Treatment is symptomatic. Although NSAIDs can be helpful for mild pain, high-dose glucocorticoids provide quicker relief for the more severe symptoms. Levothyroxine is not indicated in this hyperthyroid state. Neither thyroidectomy nor antibiotics is indicated for this problem.

A 29-year-old gravida 2 para 1 presents for pregnancy confirmation. Her last menstrual period began 6 weeks ago. Her medical history is significant for hypothyroidism, which has been well-controlled on levothyroxine (Synthroid), 150 g daily, for the past 2 years. Which one of the following would be the most appropriate next step in the treatment of this patient's hypothyroidism during her pregnancy?

A. Add liothyronine (Cytomel) to her current regimen.
B. Decrease the levothyroxine dosage.
C. Increase the levothyroxine dosage.
D. Continue her current regimen.

Answer: C.

Maternal hypothyroidism can have serious effects on the fetus, so thyroid dysfunction should be treated during pregnancy. Because of hormonal and metabolic changes in early pregnancy, the levothyroxine dosage often needs to be increased at 4–6 weeks gestation, and the patient eventually may require a 30%–50% increase in dosage in order to maintain her euthyroid status.

A 68-year-old African-American female with primary hypothyroidism is taking levothyroxine (Synthroid), 125 mg/day. Her TSH level is 0.2 IU/mL (N 0.5–5.0). She has no symptoms of either hypothyroidism or hyperthyroidism. Which one of the following would be most appropriate at this point?

A. Continuing levothyroxine at the same dosage.
B. Increasing the levothyroxine dosage.
C. Decreasing the levothyroxine dosage.
D. Discontinuing levothyroxine.
E. Ordering a free T4.

Answer: C.

Because of the precise relationship between circulating thyroid hormone and pituitary TSH secretion, measurement of serum TSH is essential in the management of patients receiving levothyroxine therapy. Immunoassays can reliably distinguish between normal and suppressed concentrations of TSH. In a patient receiving levothyroxine, a low TSH level usually indicates overreplacement. If this occurs, the dosage should be reduced slightly and the TSH level repeated in 2–3 months' time. There is no need to discontinue therapy in this situation and repeating the TSH level in 2 weeks would not be helpful. A free T4 level would also be unnecessary since it is not as sensitive as a TSH level for detecting mild states of excess thyroid hormone.

An asymptomatic 35-year-old female asks about having a thyroid test performed because hypothyroidism runs in her family. You order the tests, which show a TSH level of 7.6 IU/mL 4 (N 0.4– 5.1) and a free T4 level within the normal range. Which one of the following is most likely in this patient?

A. An euthyroid state.
B. Primary hyperthyroidism.

C. Secondary hyperthyroidism.
D. Subclinical hypothyroidism.
E. Overt hypothyroidism.

Answer: D.

Subclinical hypothyroidism is defined as slightly elevated TSH (approximately 5–10 mIU/L) and normal levels of thyroid hormone (free T4 or free T3) in an asymptomatic patient. There is a low rate of progression to overt hypothyroidism manifested by symptoms, TSH levels >10 mIU/L, or reduced levels of thyroid hormone. Recent studies have shown that there is an increased risk for cardiovascular morbidity and mortality in those with subclinical hypothyroidism. However, treatment with thyroid replacement hormone did not seem to affect this risk. The decision about whether to recommend thyroid replacement therapy to patients like the one described here should be individualized. An alternative to treating the patient with medication at this time would be to retest her TSH annually, or sooner if she becomes symptomatic.

A 35-year-old nulligravida sees you for preconception counselling. She has hypothyroidism treated with levothyroxine (Synthroid), and her most recent TSH level was in the therapeutic range. She has no symptoms of hypothyroidism. Which one of the following is the patient most likely to require if she becomes pregnant?

A. A decreased dosage of levothyroxine.
B. An increased dosage of levothyroxine.
C. The addition of liothyronine (Cytomel).
D. Substitution of desiccated thyroid hormone preparation (Armour Thyroid) for the levothyroxine.

Answer: B.

Thyroid hormone requirements increase during pregnancy. Most women with hypothyroidism who become pregnant require an increased levothyroxine dosage (SOR A). A common recommendation is to have women on fixed daily doses of levothyroxine begin taking nine doses weekly (one extra dose on 2 days of the week) as soon as the pregnancy is confirmed (SOR B). Thyroid function tests should be repeated regularly throughout the pregnancy to guide additional dosage adjustments.

A 45-year-old woman presents to your office for follow-up. She has a long history of hypothyroidism and is taking thyroid replacement therapy. She has been on 50 μg of levothyroxine daily for around 1 year, but reports that she's recently felt fatigued and has gained some weight. You obtain a TSH test, and it comes back high at 7.2 mIU/mL. You decide to increase her dosage of levothyroxine in an attempt to get her euthyroid. When should you recheck the TSH to gauge the new dosage?

A. 2 weeks after the dose adjustment.
B. 6 weeks after dose adjustment.
C. 3 months after dose adjustment.
D. 6 months after dose adjustment.

E. TSH should not be used to gauge dose adjustments.

Answer: B.

Thyroid disorders are common, with hypothyroidism being much more common than hyperthyroidism, nodular disease, or thyroid cancer. The incidence of hypothyroidism is 7% of women and 3% of men aged 60 to 89 years. Once diagnosed, the TSH level is the most important measure to gauge the dose of thyroid replacement therapy. Dose of thyroid replacement therapy will vary depending on age, weight, cardiac status, and severity of the condition. Once therapy is adjusted, a TSH level should be checked in 6 weeks and therapy should be titrated to keep the TSH in the normal range.

You are caring for a 35-year-old man who is complaining of fatigue and an inability to gain weight. Laboratory evaluation reveals a TSH of 6.0 mIU/L (high) but a normal free T4. Which of the following is the best next step?

A. Test for antithyroid peroxidase.
B. Test for thyroid autoantibodies.
C. Treat with levothyroxine.
D. Treat with levothyroxine and T3.
E. Monitor at yearly intervals.

Answer: E.

Subclinical hypothyroidism is distinguished by an elevated TSH and a normal free T4. This condition occurs in 4% to 8% of the general population. It will progress to clinical hypothyroidism at a rate of 2% to 5% per year. Risk for progression includes the presence of thyroid autoantibodies, old age, a female gender, and a TSH level greater than 10 mIU/L. Patients who do not progress are considered euthyroid with a reset thyrostat, and they should be monitored clinically and biochemically on an annual basis. Antithyroid peroxidase levels would help to diagnose autoimmune thyroiditis but would not be helpful in this case. Starting thyroxine would be appropriate if the TSH was greater than 10 mIU/L, but not if the levels were only slightly elevated.

A 26-year-old woman presents with weight gain, lethargy, dry skin, sweatiness, cold intolerance, and thinning hair. You suspect hypothyroidism and order the appropriate laboratory tests. Her TSH is high, and her free T3 and free T4 are both low. Which of the following is the most likely diagnosis?

A. Primary hypothyroidism.
B. Secondary hypothyroidism.
C. Iodine deficiency.
D. Thyroid hormone resistance.
E. Subclinical hypothyroidism.

Answer: A.

Primary hypothyroidism is common, usually a result of Hashimoto thyroiditis or after Graves' disease. In this case, the TSH would be elevated, and the free T3 and T4 would be low. Secondary hypothyroidism is related to hypothalamic or pituitary dysfunction. Iodine deficiency is a cause of primary hypothyroidism. Subclinical hypothyroidism is when the TSH is elevated, but the T3 and T4 are normal. Thyroid hormone resistance would present with the TSH, T3, and T4 all being elevated.

Which one of the following metabolic abnormalities is most likely to be seen in patients with stage 4 kidney disease?

A. Hyperaldosteronism.
B. Hyperparathyroidism.
C. Hypothyroidism.
D. Hypogonadism.
E. Type 2 diabetes mellitus.

Answer: B.

Hyperparathyroidism is present in more than half of patients who have a glomerular filtration rate <60 mL/min, and is independently associated with increased mortality and an increased prevalence of cardiovascular disease. In patients with stage 4 chronic kidney disease, current guidelines recommend monitoring of serum calcium and phosphate levels every 3–6 months and bone-specific alkaline phosphatase activity every 6–12 months with the goal of normalizing these values. The other metabolic abnormalities listed are less common than hyperparathyroidism.

According to the American Diabetes Association, screening should be considered for which one of the following conditions in children with type 1 diabetes mellitus?

A. Hypothyroidism.
B. Cystic fibrosis.
C. Cushing syndrome.
D. Systemic lupus erythematosus.
E. Pancreatic pseudocysts.

Answer: A.

Children with diabetes mellitus are at increased risk for retinopathy, nephropathy, and hypertension. They are also more likely to have immune-mediated disorders such as celiac disease and hypothyroidism. For all children and adolescents with type 1 diabetes mellitus, the American Diabetes Association recommends screening for hypothyroidism, nephropathy, hypertension, celiac disease, and retinopathy. Screening for dyslipidemia should be considered if there is a family history of hypercholesterolemia or cardiac events before age 55.

A 45-year-old female is being treated for hypothyroidism with levothyroxine (Synthroid), 112 mcg daily. She is still having persistent fatigue and weight gain despite her TSH value of 1.5 mU/mL (N 0.5–5.5). In addition to evaluating this patient for other causes of her symptoms, which one of the following would be appropriate management of her thyroid medication at this time?

A. Continuing the current therapy.
B. Increasing the dosage.
C. Adding liothyronine (Cytomel).
D. Switching to desiccated thyroid hormone (Armour Thyroid).

Answer: A.

Some hypothyroid patients who are treated with appropriate dosages of levothyroxine and whose TSH levels are in the appropriate range continue to have persistent symptoms such as fatigue, depressed mood, and weight gain. If the TSH is in the appropriate range, then no adjustment is necessary and annual serum TSH testing is recommended. Patients who remain symptomatic on an appropriate dosage of levothyroxine, as determined by a TSH<2.5 mIU/L, are not likely to benefit from combination triiodothyronine/thyroxine therapy (SOR A). Desiccated thyroid hormone preparations are not recommended by the American Association of Clinical Endocrinologists for the treatment of hypothyroidism. A meta-analysis of 11 randomized, controlled trials of combination T3/T4 therapy versus T4 monotherapy showed no improvements in pain, depression, or quality of life.

A 25-year-old female with hypothyroidism sees you for preconception counselling. Her thyroid problem has been well managed with levothyroxine (Synthroid), 75 mcg daily, but she asks your advice about changing her treatment to something more natural now that she is planning to become pregnant. Which one of the following is the best recommendation for this patient?

A. Continue the current dosage of levothyroxine.
B. Reduce the current dosage of levothyroxine to 50 mcg daily.
C. Change to a comparable dosage of combination levothyroxine/L-triiodothyronine.
D. Change to a comparable dosage of desiccated thyroid.

Answer: A.

Untreated hypothyroidism during pregnancy impairs fetal development and increases the risk of spontaneous miscarriage, prematurity, preeclampsia, gestational hypertension, and postpartum hemorrhage. These risks are mitigated by appropriate levothyroxine treatment. Levothyroxine/Triiodothyronine combinations and desiccated thyroid preparations have the potential to correct maternal hypothyroidism, but the T4 level may still be too low to provide the transplacental delivery necessary for optimal fetal health. The most appropriate pregnancy planning advice is to continue the current dosage of levothyroxine with a plan for monthly monitoring of TSH and T4 during pregnancy, with the expectation that an increase in dosage may be required as the pregnancy progresses.

A 70-year-old white female with hypertension and atrial fibrillation has been chronically anticoagulated. A higher dosage of warfarin (Coumadin) would be required to achieve a therapeutic INR if the patient were found to have

A. Malnutrition.
B. Hypothyroidism.
C. Heart failure.
D. Acute kidney injury.
E. Progressive nonalcoholic cirrhosis.

Answer: B.
Medical conditions that decrease responsiveness to warfarin and reduce the INR include hypothyroidism, visceral carcinoma, increased vitamin K intake, diabetes mellitus, and hyperlipidemia. Conditions that increase responsiveness to warfarin, the INR, and the risk of bleeding include vitamin K deficiency caused by decreased dietary intake, malabsorption, scurvy, malnutrition, cachexia, small body size, hepatic dysfunction, moderate to severe renal impairment, hypermetabolic states, fever, hyperthyroidism, infectious disease, heart failure, and biliary obstruction (SOR B, SOR C).

Which one of the following is the recommended first-line test for investigating suspected hyper or hypothyroidism?

A. Free T3.
B. Free T4.
C. TSH.
D. Antithyroglobulin.
E. Antithyroid peroxidase.

Answer: C.
The best laboratory assessment of thyroid function is a serum TSH test, which is the preferred test for diagnosing primary hypothyroidism. If an elevated serum TSH level is detected and hypothyroidism is suspected, then a free T4 measurement would be indicated.

In hypothyroid patients, which one of the following makes TSH levels alone unreliable for assessing the response to thyroid replacement?

A. A history of total surgical thyroidectomy.
B. Treatment with desiccated thyroid USP.
C. Treatment with liothyronine (T3).
D. Hypothyroidism due to pituitary disease.
E. Graves' disease.

Answer: D

Secondary centrally mediated hypothyroidism is caused by hypothalamic or pituitary disease in which TSH is not being produced, resulting in failure to stimulate the thyroid gland to make thyroid hormone. Standard treatment for this type of hypothyroidism is levothyroxine but determining the response to therapy requires measuring free T4 rather than TSH. Desiccated thyroid USP is a combination of T3 and T4 and response to treatment is usually assessed with TSH levels. T3 levels can fluctuate in patients treated with desiccated thyroid, as well as those who are on liothyronine (T3), and are therefore generally not used. TSH is also used to monitor treatment in patients with surgical hypothyroidism. Graves' disease is an autoimmune disorder commonly causing hyperthyroidism, but patients usually become hypothyroid after treatment. TSH is used to monitor these patients as well.

Which one of the following coexisting conditions could require the use of a much higher than expected dose of levothyroxine (Synthroid) to adequately treat hypothyroidism?

A. Chronic kidney disease.
B. Diabetes mellitus.
C. Helicobacter pylori gastritis.
D. Hepatitis C infection.
E. Hyperparathyroidism.

Answer: C.

Absorption of levothyroxine is impaired by several gastrointestinal conditions, including atrophic gastritis, chronic proton pump inhibitor use, and Helicobacter pylori infection. Treatment of H. pylori infection reverses this effect and following eradication of the infection a reduction of the levothyroxine dosage by 30% or more will often be required.

A 66-year-old asymptomatic male presents with a 6-month history of ongoing pruritus. A physical examination is normal. Laboratory studies are also normal except for an LDL-cholesterol level of 150 mg/dL, a free T4 level of 1.4 ng/dL (N 0.9–2.3), and a TSH level of 6.22 U/mL (N 0.4–4.5). Which one of the following would be most appropriate at this point?

A. No treatment at this time and a repeat TSH level in 3 months.
B. Testing for thyroid antibodies and treatment with levothyroxine if the test is negative.
C. A 131I uptake and scan with no treatment pending results.
D. Liothyronine (Cytomel).
E. Levothyroxine (Synthroid).

Answer: A.

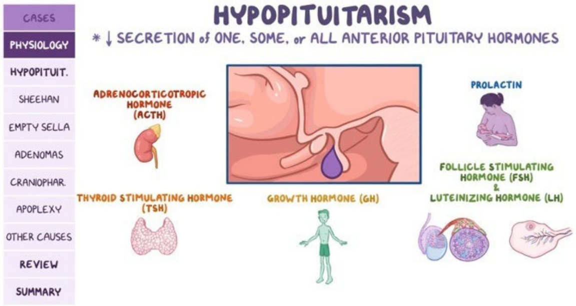
This patient has subclinical hypothyroidism and should have a TSH level repeated in 1–3 months, as TSH may fluctuate in patients without thyroid disease and return to normal on subsequent testing. In a patient with a normal free T4 the TSH level must be >10 U/mL for a diagnosis of hypothyroidism. Mild TSH elevations may be a normal manifestation of aging.

Female with oligomenorrhea and constipation and cold intolerance. Her lab shows low FSH, LH, low TSH low glucose. What is the most likely diagnosis?

A. Panhypopituitarism
B. Thyroidism.

Answer: A.

Panhypopituitarism is a condition of inadequate or absent production of the anterior pituitary hormones.


CASES
PHYSIOLOGY
HYPOPITUIT.
SHEEHAN
EMPTY SELLA
ADENOMAS
CRANIOPHAR.
APOPLEXY
OTHER CAUSES
REVIEW
SUMMARY
HYPOPITUITARISM
* ↓ SECRETION of ONE, SOME, or ALL ANTERIOR PITUITARY HORMONES
ADRENOCORTICOTROPIC HORMONE (ACTH)
PROLACTIN
FOLLICLE STIMULATING HORMONE (FSH) & LUTEINIZING HORMONE (LH)
THYROID STIMULATING HORMONE (TSH)
GROWTH HORMONE (GH)

Lady with diffuse neck swelling, euthyroid picture. TSH: 5 (High), T4 within normal limits. Antibody positive. What is the diagnosis:

C. Grave's disease.
D. Hashimoto's thyroiditis.

Answer: B.

During the early stage of thyroiditis, the levels of thyroid hormones (T3 and T4) may be normal. With chronic hypothyroidism, the thyroid hormone levels fall, and the level of thyroid stimulating hormone (TSH) becomes high.

Common presentation of Hypoparathyroidism beyond neonatal period:

A. Numbness.
B. Seizure.
C. Difficulty in breathing.
D. Hypotonia.

Answer: B.

A neonate with hypothyroidism what will you expect to see?

A. Hyperirritability.
B. Hyperreflexia.
C. Diarrhea.
D. Prolonged jaundice.

Answer: D.
UpToDate: Newborns with congenital hypothyroidism are usually asymptomatic but rarely present with lethargy, hoarse cry, feeding problems, often needing to be awakened to nurse, constipation, macroglossia, umbilical hernia, large fontanels, hypotonia, dry skin, hypothermia, and prolonged jaundice.

A 55 years old lady came to check her last investigations. TSH: 16 (High), T4 is normal. Total cholesterol (6.8 mmol/l) & TG (2.2mmol/l). What is your treatment regarding her current dyslipidemia?

A. Statins.
B. Fenofibrate.
C. Hormonal replacement
D. Levothyroxine.
E. Lithium.

Answer: D.
Subclinical hypothyroidism with TSH more than 10 is an indication for treatment with levothyroxine Conversation from mmol/L to mg/dl: TG: X 88.6 Cholesterol: X 38.7.

While you are covering preschool clinic you have one child, 5-year-old boy. On examination you found his height below 5th percentile and his weight above 95th percentile. What is the most important next test/tests you will order?

A. ACTH.
B. TSH and cortisol.
C. Urine reducing substance for metabolic disorders.
D. Urinalysis and ... (something unlikely).

Answer: B.
One of the most common deviations from normal growth patterns is an abnormal increase in weight. The

weight gain raises the question of whether the child's obesity is due to excessive food intake or to an endocrine or genetic abnormality. The answer to this question an often be found by determining the child’s height percentile. Genetic causes of increased weight such as Down syndrome are characterized by associated short stature. Endocrine etiologies of obesity such as hypothyroidism and Cushing's disease are also associated with short stature. Thus, obese children with associated short stature warrant further medical assessment. Resource: AAFP, Assessment of Abnormal Growth Curves.

A 9 years old female presented with short stature, she was always the shortest in her class 10, she is smart and doing well at school. Parents are concern that she never gets to stage puberty. Investigation shows delayed bone age, rest of examination was normal, normal parent height with normal age of puberty case of short stature, what is the diagnosis:

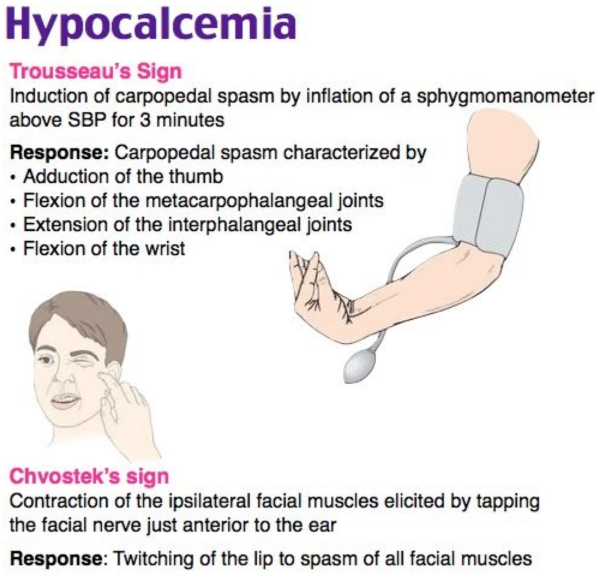
A. Constitutional short stature.
B. Familial.
C. Hypothyroidism.
D. Turner syndrome.

Answer: A.

A Patient with total thyroidectomy, positive Chvostek sign:

A. Hypocalcemia.
B. High parathyroid hormone.
C. Hypercalcemia.

Answer: A.



Hypocalcemia

Trousseau's Sign

Induction of carpopedal spasm by inflation of a sphygmomanometer above SBP for 3 minutes

Response: Carpopedal spasm characterized by
- Adduction of the thumb
- Flexion of the metacarpophalangeal joints
- Extension of the interphalangeal joints
- Flexion of the wrist

Chvostek's sign

Contraction of the ipsilateral facial muscles elicited by tapping the facial nerve just anterior to the ear

Response: Twitching of the lip to spasm of all facial muscles

Female patient complaining of increased weight, hypertension, hirsutism, high blood sugar and proximal muscle weakness. What is the diagnosis?

A. Cushing.
B. Hypothyroidism.

Answer: A.

You are seeing a 21-year-old married patient who began menstruating at age 14 and has been relatively regular since age 15. She made an appointment to be seen today because she stopped having periods 2 months ago. Which of the following is the most likely cause of her secondary amenorrhea?

A. Polycystic ovarian syndrome.
B. Pregnancy.
C. Hypothyroidism.
D. Hyperprolactinemia.

Answer: B.

A 13-Year-old girl presents with 8 months history of weight again and hair loss. Her parents notice deterioration in her school performance. which of the following has the highest diagnostic value?

A. Vitamin D level.
B. Growth hormone.

C. Complete blood count.
D. Thyroid stimulating hormone.

Answer: D.

Hypothyroidism symptoms.

A 62-year-old male is admitted to the hospital for urosepsis. His past medical history is significant only for hypertension. On examination he has a temperature of 36.5°C (97.7°F), a TSH level of 0.2 IU/mL (N 0.4–5.0), and a free T4 level of 0.4 ng/dL (N 0.6–1.5). Which one of the following is the most likely explanation for these findings?

A. Pituitary adenoma.
B. Graves disease.
C. Subacute thyroiditis.
D. Subclinical hypothyroidism.
E. Euthyroid sick syndrome.

Answer: E.

The euthyroid sick syndrome refers to alterations in thyroid function tests seen frequently in hospitalized patients, and abnormal thyroid function tests may be seen early in sepsis. These changes are statistically much more likely to be secondary to the euthyroid sick syndrome than to unrecognized pituitary or hypothalamic disease (SOR C). Graves' disease generally is a hyperthyroid condition associated with low TSH and elevated free T4. Subclinical hypothyroidism is diagnosed by high TSH and normal free T4 levels. Subacute thyroiditis most often is a hyperthyroid condition.

A 30-year-old female is 3 months postpartum. She had a recent upper respiratory infection and now has anterior neck pain, anxiety, and palpitations. On examination her thyroid is palpable and extremely tender. Laboratory testing reveals that free T4 is elevated and TSH is suppressed. Which one of the following is the most likely diagnosis?

A. Hashimoto thyroiditis.
B. Postpartum thyroiditis.
C. Subacute thyroiditis.
D. Postpartum depression.

Answer: C.

Only subacute thyroiditis is associated with a painful and tender thyroid. It often follows an upper respiratory viral illness that triggers inflammatory destruction of thyroid tissue. Thyroid hormone is increased and TSH is suppressed. Treatment consists of corticosteroids or NSAIDs. The condition is usually self-limited.

A 40-year-old female presents with a 4-week history of a persistent sore throat despite supportive treatment for a viral upper respiratory infection provided by an urgent care facility. She reports palpitations, weight loss, frequent bowel movements, and anxiety with insomnia for the past month. On examination she has a mildly enlarged thyroid gland. Laboratory evaluation is notable for a suppressed TSH level along with elevated free T4 and total T3 levels. A radioactive iodine uptake scan shows low uptake. Which one of the following is the most likely diagnosis?

A. Factitious thyrotoxicosis.
B. Graves' disease.
C. Multinodular goiter.
D. Subacute thyroiditis.
E. TSH-secreting pituitary adenoma.

Answer: D.
The initial —destructive‖ phase of subacute thyroiditis presents with signs, symptoms, and laboratory findings of overt hyperthyroidism; however, a radioactive iodine uptake scan is negative in this phase. Graves' disease and toxic multinodular goiter also present with overt hyperthyroidism, but radioactive iodine uptake is high. Factitious thyrotoxicosis is associated with low TSH and elevated or normal free T4 and total T3, but a goiter is not present. A TSH-secreting pituitary adenoma results in elevated TSH, free T4, and total T3.

A 25-year-old female who is 3 months postpartum presents with multiple complaints, including increasing weakness and fatigue, intolerance to warm environments, a weight loss of 30 lb despite an increased appetite, difficulty sleeping, awareness that her heart is beating faster and "pounding" in her chest, increasing restlessness and difficulty concentrating, increased tremulousness, and a significant swelling in her neck. She takes no medication, has experienced no recent trauma, and has not ingested large amounts of iodine. When you examine her you find no exophthalmos or lid lag and no pretibial edema, but her skin is warm, smooth, and moist. You also find a smooth, non-nodular, nontender, enlarged thyroid gland, clear lungs, a resting tremor, and hyperactive reflexes. Laboratory testing reveals a low TSH level, elevated free T3 and free T4, and high uptake on a radioactive iodine uptake scan. Which one of the following is the most likely diagnosis?

A. Postpartum thyroiditis.
B. Silent thyroiditis.
C. Subacute thyroiditis.
D. Graves' disease.
E. Exogenous thyroid ingestion.

Answer: D.
This patient has symptoms consistent with hyperthyroidism, which could be caused by any of the options listed. TSH is suppressed and free T4 and free T3 are elevated in all of these conditions. Only Graves disease,

however, will cause high radioactive iodine uptake on a thyroid scan. Uptake will be low in the other conditions.

A 57-year-old female with a past medical history significant for well-controlled type 2 diabetes mellitus, hypertension, and hyperthyroidism presents to your office with a chief complaint of a sore throat and a fever to 101.5°F at home. She has had chills and night sweats but has not had a cough, chest pain, or abdominal pain. Physical Findings General ill appearing. HEENT: diffuse tender anterior cervical adenopathy; thyroid nontender; oropharynx erythematous with some purulence on her tonsils. Cardiovascular: tachycardia without murmur. Lungs: clear to auscultation bilaterally. Skin: mild jaundice. Laboratory Findings Rapid strep test: negative, Total WBC count: 3000/mm3 (N 4500–11,000) and absolute neutrophil count 0. Total bilirubin 5 mg/dL (N 0–1.0). Alkaline phosphatase 151 U/L (N 38–126). Which one of the following medications is most likely to cause these laboratory abnormalities?

A. Amlodipine (Norvasc).
B. Aspirin.
C. Metformin (Glucophage).
D. Methimazole (Tapazole).

Answer: D.
Approximately 0.3% of patients taking methimazole develop agranulocytosis, usually within the first 60 days of starting therapy. Other rare complications of methimazole include serum sickness, cholestatic jaundice, alopecia, nephrotic syndrome, hypoglycemia, and loss of taste. It is associated with an increased risk of fetal anomalies, so propylthiouracil (PTU) is preferred in pregnancy. The other medications listed are not known to cause the combination of agranulocytosis and cholestatic jaundice that this patient has.

A 21-year-old gravida 1 para 0 is diagnosed with overt hyperthyroidism early in the first trimester. The most appropriate management at this time is?

A. Observation only.
B. Methimazole (Tapazole).
C. Propylthiouracil.
D. Radioactive iodine.
E. Thyroidectomy.

Answer: C.
Overt hyperthyroidism during pregnancy is associated with adverse effects to the mother and fetus, so treatment is required. Since methimazole is associated with birth defects when used in the first trimester, propylthiouracil is preferred. Methimazole should be considered after the first trimester because the risk of congenital anomalies is less than the risk of liver failure associated with propylthiouracil. Surgery and radioactive iodine should only be used if there is a clear indication, and radioactive iodine would not be appropriate during pregnancy.

A previously healthy 34-year-old female presents with a 1-hour history of palpitations. She does not have a cough, shortness of breath, wheezing, or chest pain. An EKG is shown below. Which one of the following laboratory tests is most likely to demonstrate the cause of the patient's underlying problem?

A. BNP.
B. D-dimer.
C. Lactic acid.
D. Troponin.
E. TSH.

Answer: E.
This patient's EKG shows atrial fibrillation with a rapid ventricular response. A TSH level should be obtained in all patients presenting with acute atrial fibrillation, because patients with subclinical hyperthyroidism have a threefold increased risk of developing atrial fibrillation. D-dimer has a negative predictive value in the diagnosis of pulmonary embolism. Elevated troponin is a diagnostic marker of acute myocardial infarction and a troponin level should be obtained when acute coronary syndrome is being considered as a cause of acute atrial fibrillation. Elevated lactic acid is associated with sepsis. BNP levels should be ordered if heart failure is suspected.

A 62-year-old female who is a new patient requests a thyroid evaluation because she has a history of abnormal thyroid test results. You obtain a copy of her records, which include a TSH level of 0.2 U/mL (N 0.4–4.2) and a free T4 level of 2.0 ng/dL (N 0.8–2.7) from 3 years ago. She reports feeling well and has no other health conditions. She does not take any medications. A physical examination reveals normal vital signs, a BMI of 23.0 kg/m2, no neck masses, a normal thyroid size, and normal heart sounds. Laboratory studies reveal a TSH level of 0.1 U/mL, a free T4 level of 2.5 ng/dL, and a free T3 level of 3.1 pg/mL (N 2.3–4.2). Treatment for this condition would be indicated if the patient has an abnormal?

A. Calcium level.
B. DXA scan.
C. Glucose level.
D. Lipid level.
E. Thyroid ultrasonography study.

Answer: B.
This patient has subclinical hyperthyroidism as evidenced by her low TSH level with normal free T4 and free T3 levels. Common causes of subclinical hyperthyroidism include, disease, autonomous functioning thyroid adenoma, and multinodular toxic goiter. Subclinical hyperthyroidism may progress to overt hyperthyroidism; this is more likely in patients with TSH levels <0.1 U/mL. Even in the absence of overt hyperthyroidism these patients are at higher risk for several health conditions, including atrial fibrillation, heart failure, and osteoporosis. For this reason, it is important to assess for these conditions and consider treating the underlying thyroid condition, as well as the complication. The American Thyroid Association

recommends treating patients with complications who are either over age 65 or have a TSH level <0.1 U/mL. Lipid and glucose abnormalities are not known to be related to subclinical hyperthyroidism. Calcium levels may be abnormal in hyperparathyroidism but not hyperthyroidism. Thyroid ultrasonography may be helpful to determine the cause of hyperthyroidism but is not used to help decide when to treat subclinical hyperthyroidism.

A 45-year-old female comes to your office for follow-up of palpitations and anxiety. Her pulse rate is 112 beats/min and her heart rate is regular with no audible murmurs. Her thyroid is non tender with no palpable nodules. You note bilateral exophthalmos as well as pretibial myxedema. Her TSH level is 0.05 U/mL (N 0.5–5.0); free T4 and total T3 levels are elevated. A pregnancy test is negative. Which one of the following would be the best option for limiting the progression of this patient's ophthalmopathy?

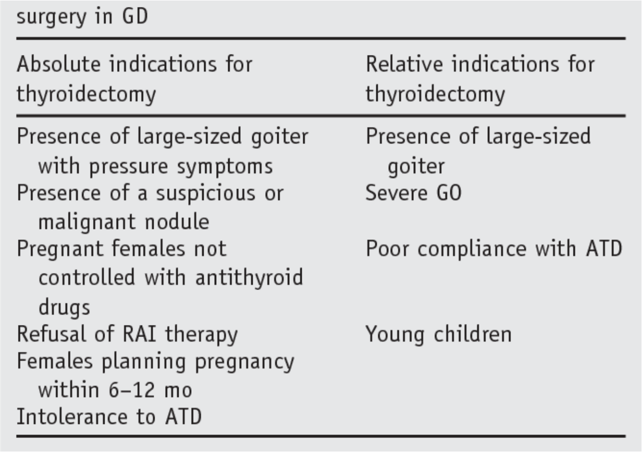
A. Atenolol (Tenormin).
B. Cholestyramine (Questran).
C. Methimazole (Tapazole).
D. Prednisone.
E. Radioactive iodine.

Answer: C.
Based on her clinical presentation and classic ophthalmopathy, this patient has Graves' disease. Unlike radioactive iodine, methimazole has been shown to decrease the risk of development or progression of ophthalmopathy in Graves' disease. Atenolol is used for symptomatic control in hyperthyroidism. Cholestyramine can help lower thyroid hormone acutely but is not a long-term treatment. Prednisone is used for severe hyperthyroidism and not long-term treatment. Atenolol, cholestyramine, and prednisone do not have any effect on the long-term complications of Graves' disease.

A 46-year-old female with a history of hyperthyroidism controlled with methimazole (Tapazole), 10 mg daily, returns to your office after an absence of several years. She has new symptoms of palpitations, heat intolerance, and hoarseness. A physical examination reveals an enlarged thyroid and a radioactive iodine uptake scan shows accumulation of tracer in multiple areas. Which one of the following is the appropriate definitive treatment for this patient?

A. Methimazole alone, 20 mg daily.
B. Methimazole, 20 mg daily, plus propranolol, 80 mg twice daily.
C. Propylthiouracil alone, 50 mg 3 times daily.
D. Radioactive iodine.
E. Thyroidectomy.

Answer: E.



surgery in GD

Absolute indications for thyroidectomy	Relative indications for thyroidectomy
Presence of large-sized goiter with pressure symptoms	Presence of large-sized goiter
Presence of a suspicious or malignant nodule	Severe GO
Pregnant females not controlled with antithyroid drugs	Poor compliance with ATD
Refusal of RAI therapy	Young children
Females planning pregnancy within 6–12 mo	
Intolerance to ATD	

An 81-year-old asymptomatic Female, who has subclinical hypothyroidism with a thyroid stimulating hormone level (TSH) of 7.0 uU/mL. (Reference range, 0.5-4.7). What is the most appropriate next step in her management?

A. Check the thyroglobulin level.
B. Perform ultrasonography of the thyroid.
C. Reassurance and recheck TSH and T4 in 6 -12 months.
D. Initiate treatment with levothyroxine 50 mcg daily and follow-up after 2 months.

Answer: C.

A 48-year-old man with no significant medical history and no symptoms is found to have elevated cholesterol at a health screening. Which of the following tests is part of the routine evaluation of this problem?

A. ECG.
B. Stress test.
C. Complete blood count (CBC).
D. Thyroid-stimulating hormone (TSH).

Answer: D.

You are screening a 35-years-old woman who presents with tachycardia, nervousness, tremor, palpitations, heat intolerance, and weight loss. You suspect graves' disease. What would you expect to find on radionucleotide uptake scanning of the thyroid with graves' disease?

A. Diffusely decreased uptake.

B. Patchy uptake.
C. Nodular areas of increased uptake.
D. Areas of increased uptake surrounded by hypoactivity.
E. Diffusely increased uptake.

Answer: E.

Once hyperthyroidism is identified, radionucleotide uptake and scanning of the thyroid is useful to determine whether the problem is due to Graves' disease or another cause. In scans of patients with Graves' disease, there is increased uptake on radionucleotide imaging with diffuse hyperactivity. Nodules demonstrate limited areas of uptake on a radionucleotide scan with surrounding hypoactivity. In subacute thyroiditis, uptake is patchy and decreased overall.

You have confirmed the patient above has graves' disease. Which of the following is the treatment of choice?

A. Radioactive iodine.
B. Methimazole.
C. Propylthiouracil.
D. b-blockade.
E. Surgery.

Answer: A.

Radioactive iodine is the treatment of choice for Graves' disease in adults who are not pregnant. Methimazole is the drug of choice in patients who choose antithyroid drug therapy, except during the first trimester of pregnancy when propylthiouracil is preferred. β-Blockade is not a treatment, but can be given to patients with symptomatic thyrotoxicosis or patients with resting heart rates of more than 90 beats/min. Surgery is reserved for patients in whom medication and radioactive iodine ablation are not acceptable, or in patients where a large goiter is compressing nearby structures or is disfiguring.

You note a thyroid nodule in a 35-year-old African American woman who is not demonstrating clinical features of thyroid dysfunction. Which of the following patient characteristics or features (if present) would increase your suspicion of malignancy?

A. The patient's age.
B. The patient's race.
C. The patient's sex.
D. If the nodule were slowly on follow up.
E. If the patient complained of persistent hoarseness.

Answer: E.

Several features of the history are associated with an increased risk of malignancy in a thyroid nodule. These include prior history of head and neck irradiation, or a family history of endocrine cancers. Also included are age less than 20 years or more than 70 years, male gender, and rapid growth of the nodule. Physical findings that raise clinical suspicion include a nodule with a firm consistency, cervical adenopathy, and symptoms like persistent hoarseness, dysphonia, or dysphagia.

When examining a 35 years old man, you notice a firm 3-cm thyroid nodule. His thyroid studies are normal and he is clinically euthyroid. An ultrasound is performed, and the nodule appears suspicious for malignancy. What should the next step in the workup be?

A. Follow thyroid studies and continue workup if abnormal.
B. Measure thyroid peroxidase antibodies.
C. Suppress thyroid with levothyroxine therapy.
D. Perform a fine needle aspirate.
E. Perform a surgical biopsy.

Answer: D.

Once a thyroid nodule is found, the next step in the workup is obtaining a TSH assay and ultrasonography of the thyroid. If the nodule appears suspicious on the basis of shape, size, margins, position, or echogenic pattern, a fine needle aspiration (FNA) should be performed irrespective of the patient's TSH level. If the patient had an elevated TSH and the nodule did not appear suspicious, thyroid peroxidase antibodies can be measured, and treatment of hypothyroidism can be initiated. If the FNA reveals malignant cells, surgical intervention is indicated.

Female patient complaining of insomnia, irritability, palpitation for 3 months, she is taking amiodarone, fluoxetine for depression, Enalapril (? Ramapril!!). What is the next step?

A. TSH.
B. Decrease anti-depressant.
C. Referral to psychiatric.
D. Propranolol?, // stop ramapril??.

Answer: A.

A female with history of weight loss, palpitations and diarrhea, difficulty falling asleep. What is the most likely diagnosis?

A. Hyperthyroidism.

Answer: A.

On routine physical examination, a 28-year-old woman is found to have a thyroid nodule. She denies pain, hoarseness, hemoptysis, or local symptoms. Serum TSH is normal. Which of the following is the best next step in evaluation?

A. Thyroid ultrasonography.
B. Thyroid scan.
C. Surgical resection.
D. Fine needle aspiration of thyroid.

Answer: A.

A 54-year-old female presented with a neck swelling which has been more noticeable over the previous four months. Examination revealed a moderate goiter and clinically she appeared euthyroid. Investigations revealed: T4: normal. TSH: 13.1 pmol/L (10-22) 5-3 Mu/L (0.4-5). Positive Anti-microsomal antibodies. What is the most likely explanation of this patient's goiter?

A. Anaplastic thyroid carcinoma.
B. De Quervains's thyroiditis.
C. Graves' disease.
D. Hashimoto's thyroiditis.
E. Multi-nodular goiter.

Answer: D.

This patient has goiter with subclinical hypothyroidism, as reflected by elevated TSH but normal T4 and elevated microsomal antibodies. This suggests a diagnosis of Hashimoto's thyroiditis.

Pregnant female at 14 weeks gestational age, with symptoms of hyperthyroidism what is treatment?

A. Methimazole.
B. PTU.
C. Propranolol.

Answer: A.

Baby with midline neck swelling and move with swallowing, what will do next?

A. US.
B. MRI.
C. CT.
D. FNA.

Answer: A.

Female patient presenting with fatigue, weight gain. Prolactin little high 200 MIU, more than normal range, no nipple discharge. TSH is high, T4 is low. What is the next step?

A. MRI.
B. Levothyroxine.

Answer: B.

A 15 years old female patient complain from hair loss, weight gain, poor school performance, what to do next?

A. CBC.
B. TSH
C. Vitamin D

Answer B

Pregnant lady present to antenatal care with enlarged tender thyroid, on examination she has exophthalmos. TSH: Low, T4: High. What to give?

A. Levothyroxine.
B. Iodine.
C. Propylthiouracil.
D. Prednisone.

Answer: C.

The treatment of choice for overt hyperthyroidism in pregnant women is Antithyroid drugs (ATDs). ATD stop the thyroid gland from making hormones. ATDs are used in children, pregnant women, and people who do not want RAI therapy. Two ATDs available in this country are methimazole (say: meth-IM-ah-zole) (brand name: Tapazole) and propylthiouracil (say: pro-pil-thy-o-YOOR-a-sil). Methimazole is used most often because it is easier to take and causes fewer side effects. Propylthiouracil is safer in pregnancy and during breastfeeding.

Women with right neck swelling, measured as 4.3 cm, no lymph node enlargement, US show transonic mass with no invasion lab was: TSH: Normal,Slight elevation of T4. What is the diagnosis?

A. Hashimoto's thyroiditis.
B. Thyroid cyst.
C. Papillary thyroid cancer.
D. Thyroid adenoma.

Answer: B.

A 14 years old female complaining of 3 months progressive left thyroid lobe nodule, 2 weeks later she complained of hoarseness. On exam firm nodule measuring 3 cm in the left thyroid lobe with no lymphadenopathy. What is most appropriate investigation?

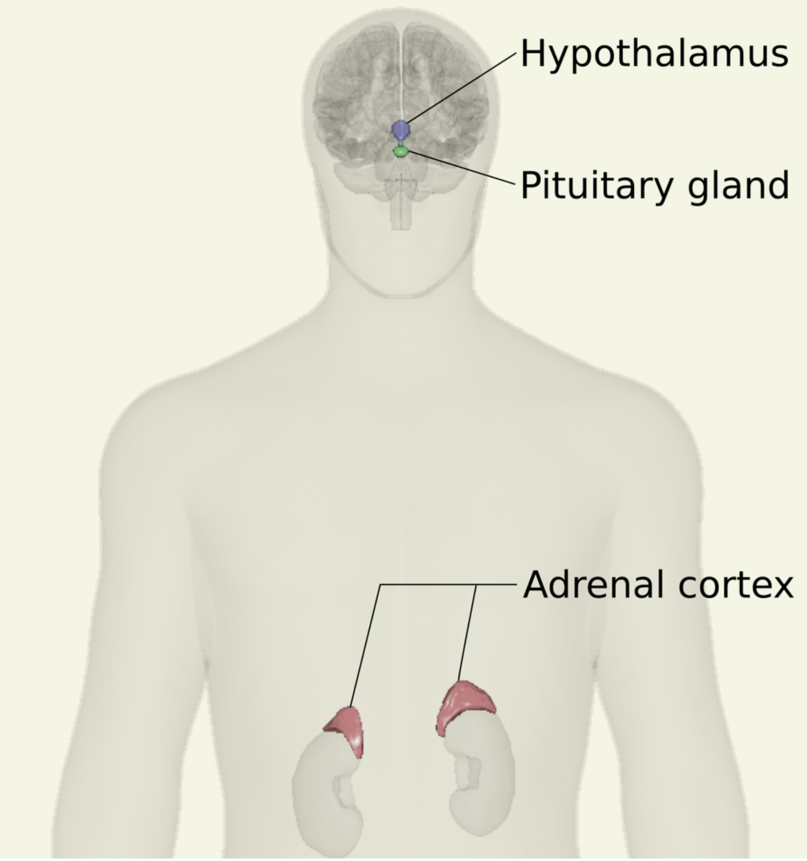
A. TSH.
B. Ultrasound.
C. FNS.
D. Radio scan.

Answer: A.

A 5 years old with failure of thrive, found markedly delayed in bone age in relation to height, age and chronological age. What is the most likely etiology?

A. Hypothyroidism.
B. Cystic fibrosis.
C. Down syndrome.
D. Gonadal dysgenesis.

Answer: A.


Hypothalamus
Pituitary gland
Adrenal cortex

Pituitary and Adrenal disorders

Collected and Reviewed by: Nuha Almasoud R3

Pituitary and Adrenal disorder

Hyperprolactinemia

Etiology

- Physiological: Stress, pregnancy, etc.
- Pharmacological: SSRIs, Methyldopa, Metoclopramide...etc.
- Pathological: Prolactinoma, other hypothalamic or pituitary disorders. Chronic renal failure (patient required dialysis).

Assessment

- History should focus on the following important points
- **Women**: Galactorrhea, Menstrual Irregularity, amenorrhea, and Infertility
- **Men**: Hypogonadotropic hypogonadism; erectile dysfunction, decreased libido, and gynecomastia.
- Symptoms of mass effect such as Visual field abnormalities and Headaches.

Investigations

- Elevated serum prolactin level.
- The normal level is 5 to 20ng/mL
- If initial serum concentration is slightly elevated (21 to 40ng/mL) test should be repeated in a fasting sample
- CT scan or MRI to identify any mass lesions
- Microadenoma 10mm or less (90%).
- Macroadenoma: More than 10mm (10%).

Note: Order a pregnancy test and TSH level because both pregnancy and primary hypothyroidism are on the differential diagnosis for hyperprolactinemia.

Management

Medical Treatment:

- Dopamine agonist:
  - Cabergoline is the best tolerated and longest-acting drug, the first drug of choice, 0.25-5 mg twice a week.
  - Bromocriptine is preferred if pregnancy is planned.
- Other treatment options:
  - Trans-sphenoidal surgery in people with microadenoma.
  - Radiotherapy usually controls adenoma growth and is slowly effective in lowering prolactin. It is the 3rd line of treatment.

Cushing's disease

Background

- **Cushing's syndrome** results from excessive levels of glucocorticoids due to any cause.
- **Cushing’s disease** results from pituitary Cushing syndrome (pituitary adenoma).
- ACTH-secreting adenoma of the pituitary (Cushing disease) is the most common cause and leads to bilateral adrenal hyperplasia.

Investigations

An overnight (low-dose) dexamethasone suppression test:

- Initial screening test.
- The dexamethasone suppression test (DST is used to assess adrenal gland function by measuring how cortisol levels change in response to oral doses or an injection of dexamethasone).
- Dexamethasone is a highly potent corticosteroid that interacts with normal body feedback.
- If the serum cortisol is < 5, Cushing syndrome can be excluded (sensitive).
- If the serum cortisol is > 5 (and often > 10), the patient has Cushing syndrome.

Then Measure ACTH level:

- If Low: adrenal tumor or hyperplasia
- If high: Order a high-dose dexamethasone suppression test to determine the cause (Cushing disease vs. ectopic ACTH tumor).
  - In Cushing's disease, the result is a decrease in cortisol levels (>50% suppression).
  - If cortisol suppression does not occur and plasma ACTH levels are high, an ectopic ACTH-producing tumor is likely the diagnosis.
- 24-hour urinary free cortisol level (values >4 times normal).

Management

Treatment of Cushing' disease (pituitary-dependent hyperadrenalism):

- Trans-sphenoidal removal of the tumor.
- External pituitary irradiation (‡ Stereotactic radiotherapy) is mainly used after failed pituitary surgery.
- Bilateral Adrenalectomy.
- Children: respond much better to radiotherapy.

Primary Hyperaldosteronism (Conn's Syndrome)

Symptoms and signs

- Hypertension.
- Hypokalemia (unprovoked hypokalemia in the face of HTN associated with Conn's 50% of the time).

Investigators

- Plasma aldosterone/plasma renin ratio > 20.
- Plasma aldosterone > 15mg/dl abnormal.
- Confirm by urine 24-hr aldosterone (~20 mg/day).
- CT-ABD useful: Solitary adenoma 70%., bilateral hyperplasia 30%.

Management

Solitary adenoma:

- Surgery - 70% normotensive; 95% normal potassium.
- Aldosterone antagonist as medical therapy.

Bilateral hyperplasia: Aldosterone antagonist therapy

Pheochromocytoma

Background

90% sporadic, 10% genetic.

MNEMONIC Pheochromocvtoma (rule of 10's)

- 10% extra-abdominal.
- 10% malignant.
- 10% bilateral.
- 10% in children.

But 30% genetic/syndromic!

Assessment

Suspect if:

- Resistant hypertension (> 3 drugs needed).
- Episodic exacerbations including headache, sweating, palpitations, esp. with position change, exercise, or any Tin intra-abdominal pressure.

Investigations

Diagnostic testing: Depends on demonstrating excessive catecholamine production.

- 24-hr urinary catecholamines or metanephrines.
- Plasma tree for metanephrines or catecholamines

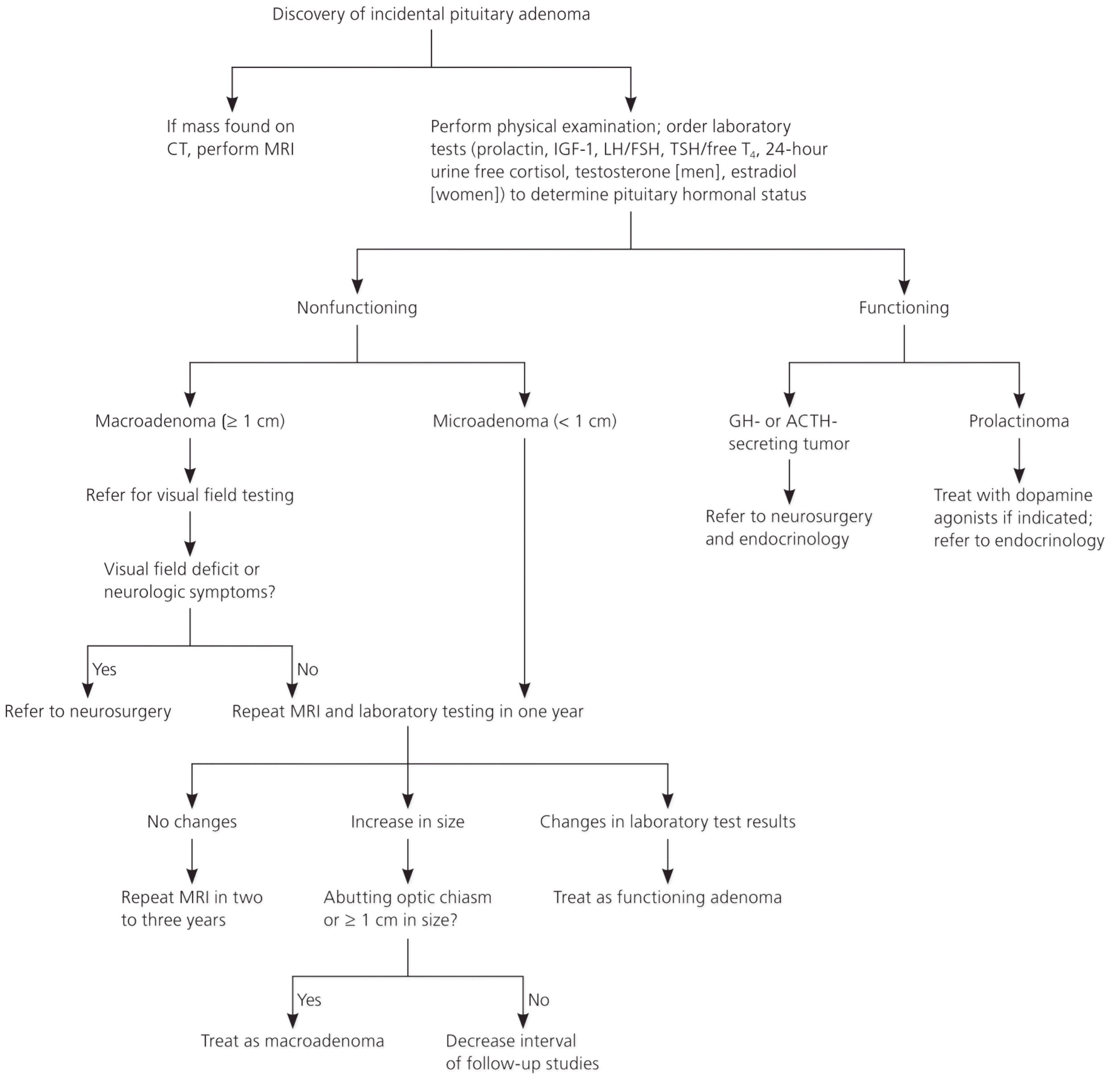
- VMA (vanillylmandelic acid) in the urine
- Localization of lesion by MRI:
    - Usually unilateral.
    - 10% bilateral.
    - 10% extra-adrenal

Management

- Surgical removal.
- Alpha-blockade to control HT (phenoxybenzamine).

References: The Essentials of Family medicine

Incidental pituitary adenoma



Discovery of incidental pituitary adenoma
If mass found on CT, perform MRI
Perform physical examination; order laboratory tests (prolactin, IGF-1, LH/FSH, TSH/free T_4, 24-hour urine free cortisol, testosterone [men], estradiol [women]) to determine pituitary hormonal status
Nonfunctioning
Functioning
Macroadenoma (≥ 1 cm)
Microadenoma (< 1 cm)
GH- or ACTH-secreting tumor
Prolactinoma
Refer for visual field testing
Refer to neurosurgery and endocrinology
Treat with dopamine agonists if indicated; refer to endocrinology
Visual field deficit or neurologic symptoms?
Yes
No
Refer to neurosurgery
Repeat MRI and laboratory testing in one year
No changes
Increase in size
Changes in laboratory test results
Repeat MRI in two to three years
Abutting optic chiasm or ≥ 1 cm in size?
Treat as functioning adenoma
Yes
No
Treat as macroadenoma
Decrease interval of follow-up studies

ACTH = adrenocorticotropic hormone; CT = computed tomography; FSH = follicle-stimulating hormone; GH = growth hormone; IGF-1 = insulinlike growth factor 1; LH = luteinizing hormone; MRI = magnetic resonance imaging; T_4 = thyroxine; TSH = thyroid-stimulating hormone.

Pituitary and Adrenal disorder
MCQs

ABFM 2022

A 36-year-old female presents for evaluation of elevated blood pressure. She is asymptomatic and does not take any medications. On examination her blood pressure is 160/96 mm Hg and her BMI is 26 kg/m2. Fasting laboratory studies include the following:
Sodium 142 mEq/L (N 136–145)
Potassium 3.0 mEq/L (N 3.5–5.1)
Creatinine 0.76 mg/dL (N 0.6–1.1)
Glucose 97 mg/dL
Which one of the following additional laboratory evaluations should be performed to assess her blood pressure?

A. A 24-hour urine collection for 5-hydroxyindoleacetic acid (5-HIAA)
B. A serum aldosterone/renin ratio
C. A serum cortisol level
D. A serum cystatin C level

ANSWER: B

Primary hyperaldosteronism should be suspected as a cause for hypertension if a patient has a spontaneously low potassium level or persistent hypertension despite the use of three or more antihypertensive medications, including a diuretic. This can be evaluated by checking a serum renin activity level and a serum aldosterone concentration and determining the aldosterone/renin ratio. Primary hyperaldosteronism typically presents with a very low serum renin activity level and an elevated serum aldosterone concentration. A 24-hour urine collection for 5-hydroxyindoleacetic acid (5-HIAA) would be used to evaluate for a neuroendocrine tumor, which can present as chronic flushing and diarrhea. Cortisol levels can be checked if Cushing syndrome is suspected. Hypertension can be present in Cushing syndrome, but it is typically associated with other signs such as obesity and an elevated blood glucose level due to insulin resistance. Cystatin C is a marker of renal function and measurement would not be indicated sgiven this patient's normal creatinine level.

A 61-year-old male is found to have a 2-cm right adrenal incidentaloma on CT. He has no history of hypertension, electrolyte abnormalities, headaches, flushing, or sweating. Which one of the following studies should be performed in patients found to have an adrenal incidentaloma?

A. An ACTH stimulation test
B. A dexamethasone suppression test
C. Paired serum aldosterone and plasma renin activity
D. Serum or urine metanephrines
E. A PET scan

ANSWER: B

Adrenal incidentalomas usually do not produce overt hormone excess, but mild autonomous cortisol secretion (MACS) is present in up to 30%–50% of cases. This mild secretion of cortisol may predispose patients to metabolic syndrome, osteoporosis, and cardiovascular events. MACS can be ruled out with an overnight 1-mg dexamethasone suppression test. The remainder of the evaluation can be based on CT findings and clinical symptoms.

You evaluate a patient with fatigue, anorexia, and nausea for adrenal insufficiency. A morning cortisol level is low. Which one of the following would be the most appropriate confirmatory test?

A. A 21-hydroxylase antibody level
B. An ACTH stimulation test
C. A low-dose dexamethasone suppression test
D. A high-dose dexamethasone suppression test
E. CT of the adrenal glands

ANSWER: B

An ACTH stimulation test is the most appropriate confirmatory test for suspected adrenal insufficiency. If a cortisol level drawn 1 or 2 hours after administration of ACTH is inappropriately low, adrenal insufficiency is confirmed, and further evaluation is indicated to determine the etiology. A 21-hydroxylase antibody level may indicate that adrenal insufficiency has an autoimmune cause but does not confirm the presence of adrenal insufficiency. Dexamethasone suppression tests, in which morning cortisol is tested after administration of dexamethasone the previous evening, are used in the evaluation of suspected Cushing syndrome. Inappropriately elevated cortisol levels are indicative of Cushing syndrome. Imaging might be useful in determining the cause of adrenal gland dysfunction once adrenal insufficiency is confirmed.

ABFM 2021

A 63-year-old female sees you for follow-up after an emergency department (ED) visit. CT performed in the ED confirmed diverticulitis and she was treated as an outpatient. The discharge paperwork and radiology reports also indicate that she has a left superior adrenal nodule measuring 1.2 cm. Which one of the following concurrent conditions should prompt a hormonal workup?

A. Hyperlipidemia
B. Hypertension
C. Renal cell carcinoma
D. Rheumatoid arthritis
E. Type 2 diabetes

ANSWER: B

Incidentally found adrenal masses are very common, occurring in 3%–7% of adults. The majority of these masses are benign non-functioning adenomas, although some are primary and functioning adrenal tumors such as pheochromocytoma and adenomas that secrete aldosterone and cortisol. Metastatic lesions are associated with bronchogenic carcinomas, renal cell carcinomas, and melanomas. Most masses measuring 1–4 cm are benign and can be monitored for growth changes with radiographs. Hormonal evaluation should be considered in patients who have a history or physical findings that would suggest a hyperfunctioning adrenal adenoma, such as hypertension. A concurrent condition of renal cell carcinoma would suggest a metastatic lesion rather than a hyperfunctioning lesion. Hyperlipidemia, rheumatoid arthritis, and type 2 diabetes are not associated with excessive adrenal function.

ABFM 2020

A 36-year-old male sees you for follow-up of progressive fatigue and lightheadedness that has worsened over the past 3 months. He has lost 5 kg (11 lb) during this time. On examination he has a BMI of 21 kg/m2, a blood pressure of 88/48 mm Hg, and a pulse rate of 66 beats/min. A skin examination is notable for patches of nonpigmented skin on the hands. Initial laboratory testing is significant for a sodium level of 132 mEq/L (N 135–145) and a potassium level of 5.3 mEq/L (N 3.5–5.0).
Which one of the following tests would confirm the most likely diagnosis?

A. 17-hydroxyprogesterone
B. ACTH stimulation
C. Dexamethasone suppression
D. Late night salivary cortisol
E. Plasma renin and aldosterone

ANSWER: B
This clinical case is consistent with Addison’s disease, or adrenal insufficiency. This case is most likely the result of autoimmune disease, given the concurrent vitiligo, but it may also be idiopathic or secondary to cancers such as lymphoma or infections such as tuberculosis. Adrenal insufficiency is suggested by a low morning cortisol level, but the test of choice to confirm this diagnosis is the ACTH stimulation test. 17-Hydroxyprogesterone deficiency causes congenital adrenal hyperplasia, which typically presents in childhood. This test is part of newborn screening in the United States. Acquired 17-hydroxyprogesterone deficiency can present in adulthood as adrenal insufficiency but a low 17-hydroxyprogesterone level does not confirm adrenal insufficiency. Late night salivary cortisol is an initial test for corticosteroid excess (Cushing syndrome) and the dexamethasone suppression test is used to confirm that disorder. Renin and aldosterone levels can be helpful to characterize mineralocorticoid deficiency but they are not diagnostic.

ABFM 2019

A 39-year-old female presents to your office with progressive swelling in the right leg that has spread over the past 2 days. She feels well otherwise. Her past medical history is significant for adrenal insufficiency treated with oral prednisone, 5 mg daily, and fludrocortisone, 0.1 mg daily. An examination reveals a temperature of 37.8°C (100.0°F), a pulse rate of 88 beats/min, a blood pressure of 105/62 mm Hg, and redness, warmth, and swelling in the right lower extremity. You diagnose cellulitis and prescribe appropriate antibiotics. Which one of the following would be the most appropriate management of her corticosteroid regimen?

A. Continue prednisone and fludrocortisone at the current dosages
B. Increase prednisone to 15 mg daily and continue fludrocortisone at the current dosage
C. Increase prednisone to 15 mg daily and increase fludrocortisone to 0.3 mg daily
D. Stop prednisone until the infection resolves but continue fludrocortisone at the current dosage
E. Stop both prednisone and fludrocortisone until the infection resolves

ANSWER: B

Patients with chronic adrenal insufficiency, either primary or secondary, may not be able to mount a stress response to infection or surgical procedures. Common practice during minor infections is to increase the corticosteroid supplementation (SOR C). Fludrocortisone should be continued, but stress dosing is not necessary.

ABFM 2018-2015

A 34-year-old female with no significant past medical history is being evaluated for acute abdominal pain. CT of the abdomen reveals a 3-cm right adrenal mass. This lesion is most likely to be which one of the following?

A. A benign adenoma
B. An adrenocortical carcinoma
C. A pheochromocytoma
D. A neuroblastoma
E. A metastatic lesion

ANSWER: A

An incidentally discovered adrenal mass is a common finding on abdominal CT and MRI, occurring in approximately 3%–4% of scans. However, only about 1% of these are malignant, and malignancies rarely occur in lesions <5 cm in size. Metastatic lesions are rare in patients without a history of cancer. An incidentally discovered adrenal mass 1–4 cm in size is most likely to be a benign adenoma, although follow-up is often indicated to ensure stability of the lesion.

A 42-year-old female continues to have elevated blood pressure while on three antihypertensive agents. You are concerned that she may have idiopathic adrenal hyperplasia or an aldosterone-producing adenoma. Which one of the following would be the most appropriate laboratory test?

A. Serum cortisol
B. An aldosterone:renin ratio
C. 17-Hydroxyprogesterone
D. A dexamethasone suppression test
E. Renal ultrasonography

ANSWER: B

Up to 28% of patients may be defined as having resistant hypertension (not controlled on three drugs or controlled on four or more drugs). Primary aldosteronism is present in up to 5%–10% of all hypertensive patients and 7%–20% of those with resistant hypertension. This may be due to bilateral adrenal hyperplasia or a unilateral aldosterone-secreting adenoma, which can be diagnosed if there is elevated serum aldosterone in the presence of suppressed renin levels. A cortisol level and a dexamethasone suppression test are appropriate tests for Cushing syndrome. A 17-hydroxyprogesterone level tests for congenital adrenal hyperplasia. Renal ultrasonography will not adequately screen for any of these conditions.

A 26-year-old female presents with a 3-month history of abdominal pain, lightheadedness with standing, and some hyperpigmentation. Her CBC is normal, but a basic metabolic panel reveals a slightly low sodium level and a slightly high potassium level. Which one of the following would be the most appropriate next step in your evaluation of this patient?

A. A serum aldosterone level
B. A corticotropin (ACTH) stimulation test
C. Paired morning cortisol and melanocyte stimulating hormone levels
D. 21-hydroxylase antibodies and 17-hydroxyprogesterone levels

ANSWER: B

This patient has signs and symptoms consistent with primary adrenal insufficiency (PAI). In Western countries autoimmunity is responsible for 90% of these cases. Because the corticotropin (ACTH) stimulation test has a higher degree of sensitivity and specificity than morning cortisol and ACTH concentrations, it is the preferred test in all patients with possible primary adrenal insufficiency. Serum aldosterone paired with plasma renin activity is used to screen for adrenal hyperplasia in hypertensive patients and also for establishing the existence of mineralocorticoid insufficiency in patients with PAI. Once the diagnosis is established, 21-hydroxylase antibodies and 17-hydroxylase progesterone levels are used to determine the etiology of PAI.

Pre test

You are evaluating a 32-year-old woman complaining of amenorrhea. She has mild hypertension, hypothyroidism, GERD, and depression. On evaluation, her prolactin level was found to be 89 ng/mL (H). Which of the following medications would be the most likely to cause the elevated prolactin level?

A. Proton pump inhibitors
B. SSRIs
C. Thiazide diuretics
D. ACE inhibitors
E. Thyroid hormone replacement

ANSWER: B

Many medications can cause hyperprolactinemia leading to amenorrhea. When hyperprolactinemia is related to medication, the measured prolactin level is usually less than 100 ng/mL. Many psychotropic medications can cause this, including benzodiazepines, SSRIs, tricyclic antidepressants, phenothiazines, and buspirone. Neurologic drugs that can increase prolactin levels include sumatriptan, valproate, and ergot derivatives. Estrogens and contraceptives can also elevate prolactin, as can some cardiovascular drugs (atenolol, verapamil, reserpine, and methyldopa). This is a less likely side effect in proton pump inhibitors, diuretics, ACE-inhibitors, and thyroid replacement.

KFMC 2022

Patient has a round face, central obesity, complains of fatigue, no abdominal striae on examination, what to do next?

A. CT of the adrenal glands
B. Measure ACTH
C. 24 hrs urine cortisol
D. Morning plasma cortisol level

ANSWER: C

A 32 year-old woman presents with a one-year history of secondary amenorrhea. She had been prescribed temazepam and dihydrocodeine. On examination she had galactorrhea. Her serum prolactin was noted to be 6000 mU/1 (<450 mU/l). What is the most likely diagnosis?

A. Drug-induced hyperprolactinemia
B. Hypothalamic lesion
C. Hypothyroidism
D. Pituitary microadenoma

ANSWER: D

A 24-year-old female presents complaining of amenorrhea. Six months ago, her menses became irregular and light. For the last 4 months, she has not had a period at all. This is causing her great distress. She has run multiple home pregnancy tests, all of which have been negative. Last week, she developed clear leakage from her nipples. menarche at age 12, no previous pregnancies, and no previous history of menstrual irregularities. Review of systems reveals frequent mild headaches, the before mentioned nipple discharge, but no visual disturbances or symptoms of hypothyroidism. Physical exam normal. In addition to a serum B-hCG and a TSH, What test(s) should be ordered next ?

A. Adrenal MRI, to evaluate for adrenal hyperplasia.
B. Karyotype, to evaluate for testicular feminization and Turner syndrome.
C. Prolactin level.

D. FSH and LH level.

ANSWER: C

A 58-year-old secretary presents with asthenia and hyperpigmented changes on her elbows and inner cheek. She also has noted her BP is low and she is dizzy when she stands. She has recently lost 5 kgs and has some nausea but no vomiting. A recent workup included a positive test for coccidioidomycosis. Appropriate testing at this time would include which one of the following?

A. CT scan of the abdomen
B. 24 hours cortisol level.
C. Adrenocorticotropic hormone (ACTH) stimulation test
D. Esophagoduodenoscopy

ANSWER: C
Adrenal Insufficiency

SFH

A 42-year-old man presents with decreased libido, erectile dysfunction, and headaches. He reports no weight change, gynecomastia, fatigue, or other symptoms. He takes no medications. Testicular size is decreased on examination. His prolactin level is 648 µg per liter (normal value, <15). Magnetic resonance imaging (MRI) reveals a sellar mass (2.5 by 1.5 by 2.0 cm) that is 5 mm below the optic chiasm and that extends bilaterally into the cavernous sinuses. Which of the followings is considered the most appropriate next step in the management?

A. Start Bromocriptine 2.5 mg daily with follow up for hormonal and imaging Study.
B. Start Cabergoline 2.5 mg daily with follow up for hormonal and imaging Study.
C. Start Testosterone therapy
D. Refer him for trans-Sphenoidal surgical removal of the sellar mass

ANSWER: A
For patients with symptomatic prolactinomas, medical therapy is the treatment of choice. Dopamine agonists have been shown to be effective in normalizing PRL, restoring reproductive hormones, shrinking adenomas, and increasing bone density via normalization of estrogen/testosterone levels. Treatment is not recommended for patients with asymptomatic macroprolactinoma. (AAFP)

Patient , his lab shows high prolactin level. His medications include risperidone, HTN medication, DM medication and dyslipidemia meds. which of following cause increased prolactin level?

A. Risperidone
B. Metformin
C. Statin
D. Lisinopril

ANSWER: A

Risperidone (atypical antipsychotic) → anti-DOPAMINE (remember : NORMALLY, dopamine ⊖ prolactin) so if we block dopamine (by antipsychotic) → ↑ Prolactin

Part 2021

A female medical free g2p2 present for annual gynecological clinic with hx of milk discharge from nipple, FSH + LH attached was in normal range?

A. Reassurance
B. Bromocriptine

ANSWER: A

(Here in this Q I think there was mentioned that Prolactin is also normal, or maybe there was mentioned that Hormonal profile is within normal range , if however; there was no prolactin mentioned in the question , Then the first step to do is to Order Prolactin)

Part 2019

In a patient presenting with truncal obesity, hypertension, type 2 diabetes mellitus, hirsutism, osteopenia, proximal muscle weakness and skin fragility, which one of the following is most appropriate next step to establish diagnosis.

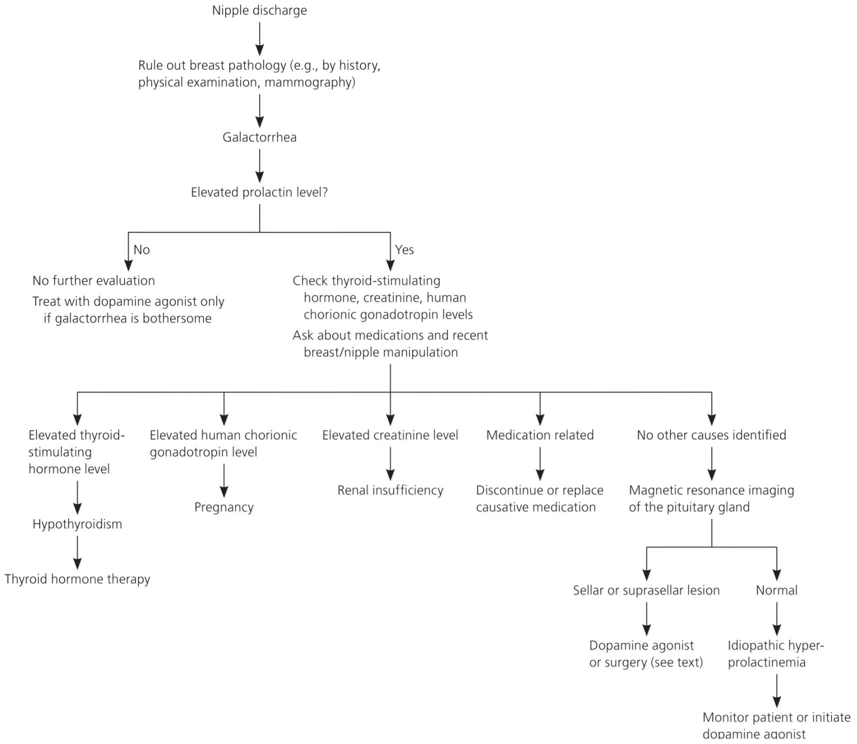
A. Aldosterone ratio
B. ACTH
C. 24 Urinary free cortisol
D. A dexamethasone suppression test

ANSWER: C

Female patient with amenorrhea and milk secretion from her breast, no headache or visual symptoms. B-hCG was negative. What is the next step?

A. Serum prolactin
B. Pituitary MRI
C. TSH
D. FSH

ANSWER: A


Nipple discharge
Rule out breast pathology (e.g., by history, physical examination, mammography)
Galactorrhea
Elevated prolactin level?
No
Yes
No further evaluation
Treat with dopamine agonist only if galactorrhea is bothersome
Check thyroid-stimulating hormone, creatinine, human chorionic gonadotropin levels
Ask about medications and recent breast/nipple manipulation
Elevated thyroid-stimulating hormone level
Elevated human chorionic gonadotropin level
Elevated creatinine level
Medication related
No other causes identified
Hypothyroidism
Pregnancy
Renal insufficiency
Discontinue or replace causative medication
Magnetic resonance imaging of the pituitary gland
Thyroid hormone therapy
Sellar or suprasellar lesion
Normal
Dopamine agonist or surgery (see text)
Idiopathic hyper-prolactinemia
Monitor patient or initiate dopamine agonist

Part 2018

A 26-year-old male asthmatic, follows for HTN, standing BP and sitting BP difference is lower than 10 systolic and 5 diastolic. Below his lab results;
Na = 142
K = 2.9
Glucose = 5
Bun = 4
Which of the following is the most likely diagnosis?

A. Cushing syndrome
B. Pheochromocytoma
C. Conn’s syndrome
D. Addison’s disease

ANSWER: C

Primary Hyperaldosteronism (Conn's Syndrome)

- Hypertension.
- Hypokalemia

Promotion 2022

A young girl with history of fatigue and weakness and dizziness with standing position for 6 months, history of alopecia aerata treated with intralesional steroid for 6 months, Examination shows hyperpigmentation in mucosal areas and knuckles. Labs low cortisol. What is the most likely diagnosis?

A. 1ry adrenal insufficiency
B. 2ndry adrenal insufficiency
C. Iatrogenic adrenal insufficiency

ANSWER: A

Promotion 2021

A 55-year-old man presents to the urgent care clinic with anorexia, nausea, vomiting, abdominal pain, and fever. His temperature is 38.6°C (101.5°F). Palpation of the abdomen reveals abdominal pain. Several hyperpigmented lesions are seen on the arms and chest. Laboratory studies show hyponatremia, hypoglycemia, and a normocytic anemia. Which of the following is the most likely diagnosis?

A. Acute appendicitis
B. Acute pancreatitis
C. Cushing syndrome
D. Primary adrenal insufficiency

ANSWER: D

Anorexia, nausea, vomiting, abdominal pain, fever, and hyperpigmentation suggest primary adrenal insufficiency, also known as Addison disease. Presentations of adrenal insufficiency vary and typically depend on the extent of loss of adrenal function and can range from an acute adrenal crisis and shock to a gradual or even undetected illness. Autoimmune primary adrenal insufficiency results from chronic destruction of the adrenal glands via autoimmune processes. Patients typically present with abdominal tenderness, hyperpigmentation, weight loss, and fever. Laboratory studies usually show hyponatremia, hypoglycemia, and a normocytic anemia.

Promotion 2019

A patient known case of TB. Presented with episodes of dizziness associated hypopigmentation in his skin. what is the diagnosis?

A. Addison's disease

ANSWER: A

Female patient presenting with High BP and Wight gain she also report irregular period and difficulty in standing from sitting position . On examination; obese with increase dorsocervical fat pad. What is the diagnosis?

A. Cushing syndrome

ANSWER: A

Promotion 2018

Female patient complaining of increased weight, hypertension, hirsutism high blood sugar and proximal muscle weakness. What is the diagnosis?

A. Cushing
B. Hypothyroidism

ANSWER: A

An old patient with erectile dysfunction , galactorrhea and gynecomastia .. what is your diagnosis ?

A. Prolactinoma
B. Prostate cancers

ANSWER: A

Dr Ola Alqudah's quastions

A 24-year-old woman presents with an eight-month history of amenorrhea. She is not on any prescribed medication but uses over the counter acne treatments. Her body mass index is 31 kg/m2, she has a small amount of hair growth on her chin, abdominal and pelvic examinations are normal.
She is investigated and her blood results show:

LH 11.8 U/L (0.5-14.5)
FSH 4.2 U/L (1-11)
Testosterone 3.5 nmol/L (0.8-3.1)
Prolactin 580 mU/L (90-520)
Fasting glucose 6.4 mmol/L (<6.0)
What is the most likely diagnosis?

A. Congenital adrenal hyperplasia
B. Type 2 diabetes mellitus
C. Androgen secreting tumor
D. Polycystic Ovarian Syndrome
E. Prolactinoma

ANSWER: D

Polycystic ovarian syndrome (PCOS) is characterized abnormal hormonal cycling and enlargement of the ovaries with the development of multiple ovarian cysts. Diagnosis requires exclusion of other causes of polycystic ovaries and the presence of at least two of the following (Rotterdam Criteria): Oligo/anovulation Clinical and/or biochemical hyperandrogenism, or Polycystic ovaries on ultrasound scanning.

A 30-year-old gentleman with stable schizophrenia reports reduced libido and diminished ejaculate volume. He is on regular haloperidol. Blood tests showed a prolactin level of 3500 mU/L. There is no previous prolactin level recorded. Which is the SINGLE MOST appropriate NEXT management step? Select ONE option only.

A. Stop antipsychotics
B. Start cabergoline
C. Start bromocriptine
D. Refer to endocrinology
E. Repeat prolactin blood test

ANSWER: D

A significantly raised prolactin or a symptomatic patient requires further investigation in secondary care. Hyperprolactinemia is often caused by antipsychotic medication. Mild increases (up to 1000 mU/L) can be caused by various causes such as stress, sexual activity and the time of day. In this case, the prolactin is significantly raised, and the patient is symptomatic. At levels of >3000, most guidelines suggest that you should consider an endocrine cause, particularly in a symptomatic patient. Psychiatry will need to be informed to consider a dose reduction/substitution of the current antipsychotic and endocrinology will need to consider investigating for a prolactinoma. If the patient had a normal prolactin level before haloperidol was started, a referral to endocrinology could be postponed as it could be assumed the antipsychotic led to the raised prolactin. Repeating the prolactin blood test would be helpful, but as the patient is symptomatic and the level is high, referral prior to repeating would be advised.

A 34-year-old woman comes to the clinic complaining of galactorrhea. She has several medical problems including asthma, indigestion and intermittent vomiting and takes some over the counter medications. Which of the following medications is known to cause hyperprolactinemia and galactorrhea?

A. Metoclopramide
B. Aspirin
C. Paracetamol
D. Spironolactone
E. Fluticasone
F. Omeprazole

ANSWER: A

Dopamine antagonists and some high dose SSRIs may lead to hyperprolactinemia. Omeprazole isn't associated with hyperprolactinemia, although cimetidine, the over-the-counter indigestion preparation is. Other drugs such as spironolactone are known to cause gynecomastia but not galactorrhea.

A 21-year-old woman presents to the GP with frequent collapses. She has been feeling very lethargic and nauseated over the past few months and feels unable to continue with her part-time job. There is no past medical history of note, and her only medication is the contraceptive pill. On examination her BP is 90/65 mmHg, she looks very tanned, and her BMI is 18 kg/m2. Investigations show:

Haemoglobin 10.4 g/L (11.5-16.0)
White cell count 6.1 ×109/L (4-10)
Platelets 196 ×109/L (150-400)
Sodium 133 mmol/L (134-143)
Potassium 6.1 mmol/L (3.5-5)
Creatinine 170 µmol/L (60-120)
Glucose 4.4 mmol/L (<7.0)
TSH 7.1 mU/L (0.5-6.0)

Following a visit to the local outpatient clinic, which of the following medications is most likely to be given to treat her underlying condition:

A. Hydrocortisone
B. Furosemide
C. Prednisolone
D. Carbamazepine
E. Thyroid hormone

ANSWER: A

This woman has Addison's disease, as evidenced by her clinical symptoms, increased tanning due to the melanocyte-stimulating hormone (MSH)-like action of very high levels of adrenocorticotropic hormone (ACTH), hyperkaliemia and hyponatremia. At presentation, Addison's is frequently associated with evidence of mild hypothyroidism, yet this often resolves after corticosteroid therapy is commenced, and thyroid hormone should not be commenced as the first option. The most likely etiology of her Addison's is autoimmune pathology; in other areas, such as the developing world, tuberculosis is responsible for a high number of cases. Usually, fludrocortisone is given as well to children but in adults, hydrocortisone alone is thought to have sufficient mineralocorticoid activity.

A 43-year-old transplant recipient is noted to have developed truncal obesity since his operation and is complaining of generalized weakness. Routine urea and electrolytes (U&Es) indicate hypokalemia and hypochloremia.

The correct answer is Cushing's syndrome

Explanation

The clinical picture is of Cushing's syndrome and occurs as a result of corticosteroid immunosuppression. The condition is less common than previously as new regimens are steroid-sparing. The syndrome differs from Cushing's disease which is due to a pituitary adenoma.

A 48-year-old female with a three-year history of type 2 diabetes presents at annual review. Despite optimization of her oral hypoglycemic therapy, she has gained approximately 5 kg in weight over the last year and her HbA1c has deteriorated. She is also treated with ramipril, Bendroflumethiazide, and amlodipine, but her blood pressure remains difficult to control with a recording of 172/102 mmHg. On examination, she has developed abdominal striae, thin skin is noticeable with bruising, and she also has a proximal weakness. A diagnosis of Cushing's syndrome is suspected.

What is the most appropriate investigation for this patient?

A. Chest x ray
B. 24-hour urine free cortisol concentration
C. 9 am ACTH concentration
D. CT scan adrenals
E. 9 am cortisol concentration

ANSWER B

Appropriate screening tests for Cushing's syndrome include a 1 mg overnight dexamethasone suppression test (1 mg dexamethasone given at 11 pm and the cortisol measured at 9 am the following morning). Overnight dexamethasone suppression test is the preferred test, as urinary collection has lower sensitivity.

A cortisol concentration less than 50 nmol/L after this test would be regarded as normal.

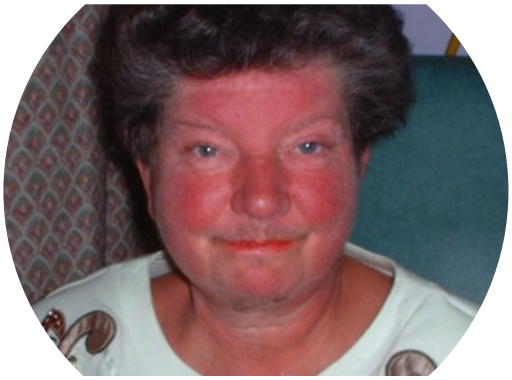
Another equally good and easy to perform test is a 24-hour urine collection measuring free cortisol in the urine.

An elevated cortisol (usually above 250 nmol/day) suggests Cushing's syndrome.

Random cortisol or 9 am cortisol provides no diagnostic information whatsoever.

Chest x ray and adrenal CT are useful in investigating the possible cause of Cushing's syndrome.

This 60-year-old female presents with a three-year history of weight gain and fatigue. She has recently been diagnosed with type 2 diabetes and has required insulin. Examination reveals the appearances as shown, a blood pressure of 166/94 mmHg and a pulse of 78 beats per minute regular. Examination of her chest and abdomen are generally normal except for central obesity and her BMI is 36.5 kg/m2.



Which would be the most appropriate investigation for this patient?

A. Ultrasound scan of ovaries
B. 24-hour urine catecholamine measurement
C. 24-hour urine free cortisol concentration
D. Random cortisol concentration
E. 17 beta-estradiol concentration

ANSWER C
The patient appears cushingoid with a round red face.
The hypertension, obesity and diabetes are also suggestive.
The best screening test for Cushing's syndrome would therefore be measurement of a 24-hour urine collection for free cortisol concentrations. High concentrations have over 90% sensitivity and specificity for the diagnosis of Cushing's

A 35-year-old man presents with weight loss, sweats and palpitations. On examination he is found to have a blood pressure of 168/100 mmHg and a pulse of 106 bpm.

Correct answer phaeochromocytoma
Explanation
Phaeochromocytoma is a tumor arising in the adrenal medulla and represents one of the surgically correctable causes of hypertension. It classically shows elevated urinary levels of catecholamines, metanephrines, and vanillylmandelic acid (VMA). Patients with phaeochromocytomas should undergo resection but require preoperative alpha and beta blockade to prevent intra-operative catecholamine release.

A 70-year-old woman is referred by a GP colleague to the hospital with a breast lump.
She is asymptomatic but her investigations reveal:
Corrected calcium 2.72 mmol/L (2.2-2.6)

Phosphate 0.79 mmol/L (0.8-1.4)
Alkaline phosphatase 110 U/L (45-105)
PTH concentration 5.5 pmol/L (0.9-5.4)

What is the most likely diagnosis?

A. Bony metastases
B. Multiple myeloma
C. Chronic vitamin D excess
D. Ectopic PTH related peptide (PTHrp) secretion
E. Primary hyperparathyroidism

ANSWER E

A tricky question. The main learning point we want you to pick up from this question is that PTH may be elevated or "inappropriately normal" in primary hyperparathyroidism. You'll be expecting an elevated PTH in order to make the diagnosis, but this isn't always the case.
This patient has hypercalcemia with a borderline low phosphate concentration and a minimally elevated parathyroid hormone (PTH) concentration (it could be normal or elevated, remember).
This suggests hyperparathyroidism which is a relatively common disorder amongst elderly females.
Vitamin D excess would be expected to cause an elevated phosphate.
Bony metastases and multiple myeloma can both result in hypercalcemia, which should result in a suppressed PTH.
PTH related peptide is a common cause of hypercalcemia in malignancy. It is not usually detected by normal lab tests for PTH and therefore you would expect a low PTH in the setting of hypercalcemia.
If this was multiple myeloma you would expect a physiological decrease in PTH as a response to the hypercalcemia. PTH is inappropriately normal here, as mentioned above, which should lead you to a diagnosis of primary hyperparathyroidism.

On reviewing the blood results of a patient, you note mild hypercalcemia. The full blood count, renal function, serum electrolytes, liver function tests and thyroid function tests were all normal. A subsequent repeat serum calcium shows persistence in the mild hypercalcemia along with a raised parathyroid hormone. The patient is otherwise asymptomatic.
Which of the following would be the next most appropriate management step?

A. Advise a reduction in dietary calcium intake
B. Refer to the on-call medical team
C. Oral calcitonin
D. Oral bisphosphonate
E. Refer to endocrinology

ANSWER E

It is important to consider the differential when an incidental finding of hypercalcemia is found. Severe hypercalcemia (>3.40mmol/L) or those with symptoms would require immediate hospital review. Mild hypercalcemia may warrant further investigations depending on the clinical context e.g. chest x ray, serum and urine protein electrophoresis and serum cortisol. NICE advises a referral to endocrinology for patients who are suspected to have primary hyperparathyroidism. They will exclude other causes of hypercalcemia and assess whether a parathyroidectomy would be appropriate. Although the use of calcimimetic drug treatments and bisphosphonate therapy are potential treatments, these would be considered in secondary care in the first instance. A normal dietary intake of calcium is usually advised.

A 42-year-old woman who has undergone an extensive thyroid resection comes to see you for follow up some six weeks later. She has recovered well from the operation but reports problems with muscle cramps; these have been so severe on two occasions that she has suffered from cramping and spasm in her hands.
On examination she is a little hypotensive at 105/60, and her pulse is 45. Her reflexes seem quite brisk, but neurological examination is otherwise normal.
Which of the following is the most likely finding on blood testing?

A. Hypercalcaemia
B. Hyperthyroidism
C. Hyponatraemia
D. Hypocalcaemia
E. Hyperparathyroidism

ANSWER D
Post-surgical hypoparathyroidism may take weeks or even months to appear after thyroid surgery. Symptoms include:

- muscle cramps
- lethargy
- bradycardia and hypotension not responsive to pressors, and
- carpopedal spasm due to hypocalcaemia.

The history here is very typical for hypoparathyroidism, and serum electrolytes, LFTs and PTH assay would be the most appropriate next investigations.

A 67-year-old woman complains of lack of energy and generalised aches. Urea and electrolyte concentrations are normal, but corrected calcium concentration is 1.98 mmol/L (2.2-2.6) and phosphate is low at 0.66 mmol/L (0.8-1.4). Further tests show that 25-hydroxy vitamin D level is 12 IU/L (15-50) and parathyroid hormone level is 25 (3-6). What is the most likely diagnosis?

A. Vitamin D deficiency
B. Pseudohypoparathyroidism
C. Primary hyperparathyroidism
D. Pseudopseudohypoparathyroidism
E. Fanconi’s syndrome

ANSWER A
This patient has vitamin D deficiency as evidenced by low a 25-hydroxy vitamin D level with consequent

hypocalcaemia.

The metabolic compensation to this is secondary hyperparathyroidism which is demonstrated by elevated parathyroid hormone (PTH) levels.

In primary hyperparathyroidism one would expect an elevated calcium concentration and low phosphate.

In pseudohypoparathyroidism and pseudopseudohypoparathyroidism an elevated phosphate would be expected.

A 41-year-old woman attends for annual medication review. She was diagnosed with hypothyroidism several years ago and is prescribed thyroxine. Prior to the appointment she has had her thyroid function checked. Her results show free T4 of 29 pmol/L (normal range 9.0-25) and a TSH of 12 mU/L (0.5-6.0) Which of the following is the cause of her results?

A. Medication non-compliance
B. Under-replacement of thyroxine
C. Sick euthyroidism
D. Pregnancy
E. Subacute thyroiditis

ANSWER A

In this case we have a patient already known to have hypothyroidism being prescribed thyroxine replacement. Her latest bloods prior to her medication review show an elevated thyroid-stimulating hormone (TSH) and elevated thyroxine (T4).

Pregnancy can affect hormone binding and typically causes an abnormal(raised) T4 with a normal TSH. Other causes of abnormal hormone binding include drugs such as amiodarone.

Sick euthyroidism describes abnormalities in the thyroid function tests that are due to a non-thyroidal illness. When a patient recovers from a non-thyroidal illness the abnormal thyroid function tests (TFTs) should revert to normal.

Classically sick euthyroidism causes 'everything to go low' (low T4, T3 and TSH). Subacute thyroiditis causes hyperthyroidism (low TSH, high T4) and presents with a painful goiter and high erythrocyte sedimentation rate (ESR). It is usually self-limiting.

Under-replacement of thyroxine would cause a high TSH and low T4.

Medication non-compliance is the correct answer and of the options the only answer that could account for the test results.

In this case the patient has not been taking her thyroxine regularly but as she has a medication review and a blood test prior to her appointment she has started taking her thyroxine again. This is a relatively common scenario where patients know that their thyroid function will show that they have not been taking their medication regularly and so prior to testing they start taking the thyroxine.

Erratic thyroxine dosing causes an elevated TSH (as they are under-replaced) but the recent use of thyroxine causes a normal to high T4.

On examination, you notice that her palmar creases are pigmented as is her buccal mucosa. Her blood pressure is 108/88 mmHg sitting and 88/62 mmHg standing. Otherwise, you cannot elicit any other focal findings.

The blood tests show:

SODIUMC 131 MMOL/L (137-144)
Potassium 5.6 mmol/L (3.5-4.9)
Urea 11.1 mmol/L (2.5-7.5)
Creatinine 96 µmol/L (60-110)
Random glucose 3.1
What is the underlying diagnosis?

A. Conn's syndrome
B. Addison's disease
C. Bartter's syndrome
D. Cushing's syndrome
E. Graves' disease

ANSWER B
This lady has Addison's disease (AD).
AD is due to primary adrenocortical insufficiency which is primarily considered to be caused by autoimmune mechanisms. It can therefore co-exist and is associated with other autoimmune conditions (such as vitiligo in this case).
AD can be a difficult diagnosis to make as the clinical features are often very non-specific, they include:

- Weakness
- Anorexia
- Loss of weight
- Abdominal pain
- Depression
- Lethargy, and
- Dizziness.

The classic clinical sign is hyperpigmentation, especially seen in the palmar creases and buccal mucosa. Postural hypotension is also a feature.
Laboratory tests show:

- Raised potassium
- Low sodium
- Low glucose
- Uraemia, and
- Mild acidosis.

Diagnosis is made by carrying out a Synacthen test (short ACTH stimulation test). This looks at cortisol levels before and half an hour after synthetic ACTH is administered to the patient.

A 62-year-old male is reviewed complaining of lethargy and fatigue. There is little of note in his history except for gastro-oesophageal reflux disease for which he takes ranitidine. He is a smoker of 10 cigarettes per day and drinks approximately 15 units of alcohol weekly. He has retired from work as an engineer.
No abnormalities are found on examination.
You request some blood tests which reveal:
Sodium 128 mmol/L (137-144)
Potassium 4 mmol/L (3.5-4.9)
Urea 3.8 mmol/L (2.5-7.5)

Creatinine 70 µmol/L (60-110)
Fasting glucose 5.5 mmol/L (3.0-6.0)
FBC Normal
From the list select appropriate investigations for this patient.

A. Random cortisol
B. Chest x ray
C. Endoscopy
D. Tumour markers
E. Faecal occult blood
F. Calcium

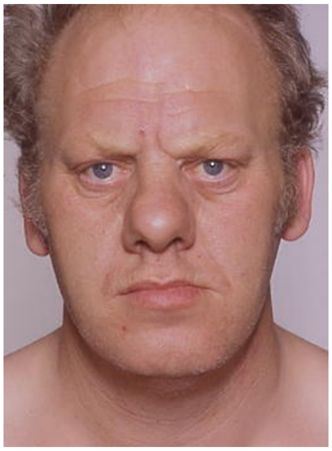
ANSWER B
This patient has mild hyponatraemia which is the commonest biochemical abnormality.
The causes of hyponatraemia are legion but in view of this man's symptoms, his hyponatraemia and his smoking status, bronchial carcinoma with syndrome of inappropriate antidiuretic hormone (SIADH) should be considered and a chest x ray performed.

A 40-year-old male with type 2 diabetes has difficulty in controlling his hypertension. He is currently being treated with atenolol, amlodipine and ramipril but his blood pressure remains consistently above 170/100 mmHg. Examination reveals grade II hypertensive retinopathy.
His investigations reveal:
Sodium 144 mmol/L (137-144)
Potassium 3.1 mmol/L (3.5-4.9)
Urea 5.5 mmol/L (2.5-7.5)
Creatinine 100 mol/L (60-110)
Glucose 7.9 mmol/L (3.0-6.0)
HbA1c 53 mmol/mol (20-46) - 7% (3.8-6.4)
ECG Left ventricular hypertrophy
Which diagnosis should be considered as a cause of his resistant hypertension?

A. Primary hyperparathyroidism
B. Phaeochromocytoma
C. Renal artery stenosis
D. Conn's syndrome (primary hyperaldosteronism)
E. Cushing's syndrome

ANSWER D
This patient has a low potassium concentration and resistant hypertension despite being on an angiotensin-converting enzyme inhibitor (ACEi) that should produce an elevation of his potassium concentration.
Primary hyperaldosteronism may be due to an adrenal adenoma (Conn syndrome) or bilateral adrenal hyperplasia.
The low potassium concentration is highly suggestive.
It may be diagnosed based on an elevated aldosterone:renin ratio (usually above 1000)

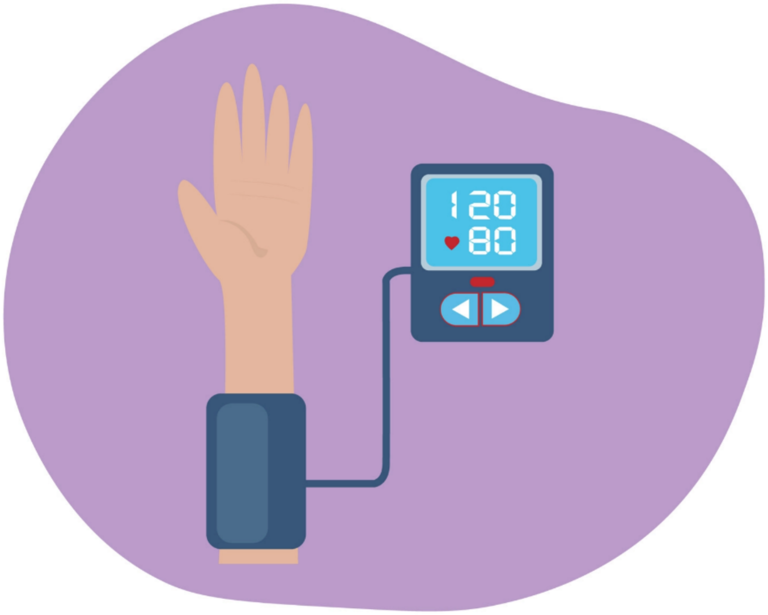
This 50-year-old male presents with a year's history of sweats and headache Examination reveals the appearance as shown. He has a blood pressure of 165/100 mmHg, a BMI of 29.5 and a pulse of 86 beats per minute.
Urinalysis reveals ++ glycosuria but nil else.



What is the likely diagnosis?

A. Carcinoid syndrome
B. Acromegaly
C. Type 2 diabetes mellitus
D. Cushing's syndrome
E. Paget's disease

ANSWER B
This patient has coarse facial features with large lips, prognathism, supra-orbital ridging typical of acromegaly.
The hypertension, sweats and probable diabetes are supportive.
In the selection of answers, T2DM is a distractor as 30% of acromegalics will have impaired glucose tolerance or diabetes.
Other features that may be expected on examination include
- A bitemporal hemianopia
- Macroglossia, and
- Carpal tunnel syndrome.



Hypertension

Collected by: Afnan Alshenaifi R3
Reviewed by: Nawaf Alghathber R2
Editing and final revision: Nuha Aalmasoud R3

Definitions:

HTN: is defined as persistent SBP and/or DBP (office or out-of-office) levels above which harm and significant increment of morbidity and mortality are observed if left untreated.

Isolated Systolic HTN: is defined as a blood pressure ≥130 mmHg systolic and <80 mmHg diastolic.

Isolated Diastolic HTN: is defined as a blood pressure <130 mmHg systolic and ≥80 mmHg diastolic.

White-coat HTN: Elevated BP in the office at repeated visits, normal out of the office.

Masked (isolated ambulatory) HTN: Normal BP in the office at repeated visits & elevated out of the office. Possible causes: anxiety, stress.

Resistant HTN: hypertension that remains uncontrolled (≥ 130/80 mm Hg) despite treatment with ≥ 3 antihypertensives OR requires ≥ 4 medications to be controlled. The antihypertensives should be maximally dosed, work via different mechanisms, and include a diuretic.

Risk Factors:

Non-Modifiable	Modifiable
• **Genetic factors.** • **Age:** Increases with age. • **Sex: Men>Women until menopause thereafter women will also attain almost** the same level. • **Family history:** Twice as common. • **Race:** Blacks have higher prevalence.	• High-sodium diet. • Obesity. • Physical inactivity. • Smoking habits. • Excessive alcohol consumption. • Insulin resistance (syndrome).

Screening:

- **USPSTF** and **SHAMS** recommend screening for high blood pressure in all adults aged 18 years or older. **Grade A**.
- Primary hypertension in asymptomatic children and adolescents to prevent subsequent cardiovascular disease in childhood or adulthood. **Grade I.**
- Screening is recommended annually for adults aged ≥40 years, who are at increased risk of high blood pressure (high-normal blood pressure (130–139/85–89 mm Hg), and overweight or obese). **SHAMS.**
- Adults aged 18–39 years with normal blood pressure (<130/85 mm Hg) who do not have other risk factors should be re-screened every 3–5 years. **SHAMS.**

Classification of HTN (By Etiology):

- **Essential or Primary HTN:** High BP with no secondary cause identified.
- **Secondary HTN:** About 10% of cases of HTN. The main causes of secondary HTN are:

1. Renoparenchymal disease.
2. Renovascular disease.
3. Primary hyperaldosteronism.
4. Cushing syndrome.
5. Pheochromocytoma.
6. Thyroid or parathyroid disease.
7. Coarctation of the aorta.
8. Obstructive sleep apnea.
9. Substance-Induced:

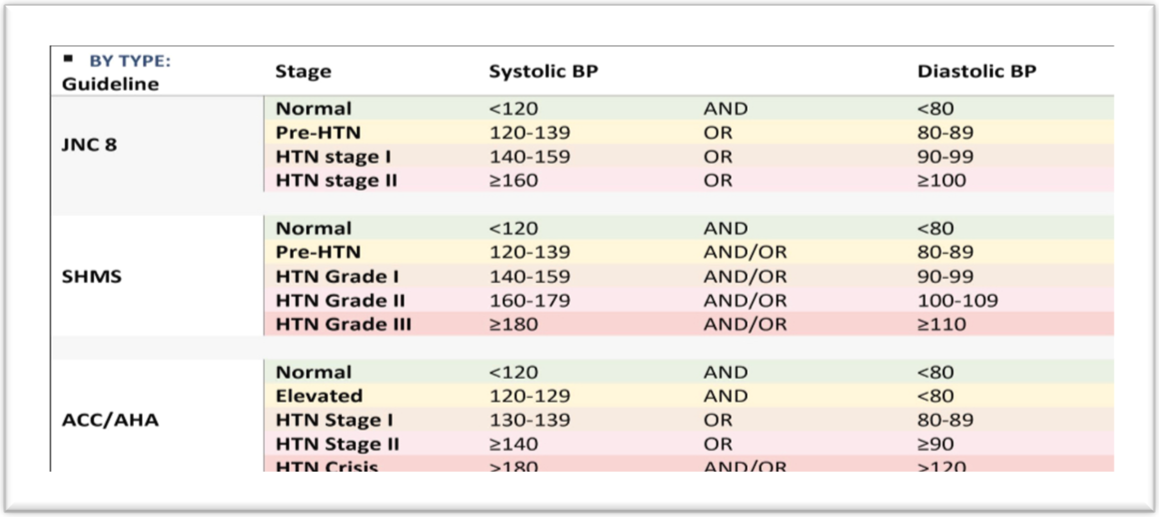
- **Medications:** OCP, NSAIDs, Steroids, Cyclosporine.
- **Plant extract:** Licorice.
- **Hormones:** Erythropoietin.
- **Substances:** Cocaine, Amphetamine, Excessive

Table 3. Signs and Symptoms That Suggest Specific Causes of Secondary Hypertension

Signs/symptoms	*Possible secondary hypertension cause*	*Diagnostic test options*
Increase in serum creatinine concentration of at least 50% (≥ 0.5 to 1 mg per dL [44 to 88 μmol per L]) after starting angiotensin-converting enzyme inhibitor or angiotensin receptor blocker Moderate to severe hypertension and unilateral small kidney/recurrent flash pulmonary edema Renal bruit	Renal artery stenosis	CT angiography Doppler ultrasonography of renal arteries Magnetic resonance angiography with gadolinium contrast media
Elevated serum creatinine Proteinuria	Renal diseases	Estimated glomerular filtration rate Renal ultrasonography
Hypokalemia	Primary hyperaldosteronism	Renin and aldosterone levels to calculate aldosterone-to-renin ratio
Apneic episodes during sleep Daytime sleepiness Snoring	Obstructive sleep apnea	Polysomnography (sleep study) Sleep Apnea Clinical Score with nighttime pulse oximetry
Flushing Headaches Labile blood pressures Orthostatic hypotension Palpitations Sweating Syncope	Pheochromocytoma	24-hour urinary fractionated metanephrines and normetanephrines Plasma free metanephrines
Arm to leg systolic blood pressure difference > 20 mm Hg Delayed or absent femoral pulses Murmur	Coarctation of the aorta	Magnetic resonance/CT angiography (adults) Transthoracic echocardiography (children)
Buffalo hump Central obesity Moon facies Striae	Cushing syndrome	24-hour urinary free cortisol Late-night salivary cortisol Low-dose dexamethasone suppression
Bradycardia/tachycardia Cold/heat intolerance Constipation/diarrhea Irregular, heavy, or absent menstrual cycle	Thyroid disorders	Thyroid-stimulating hormone

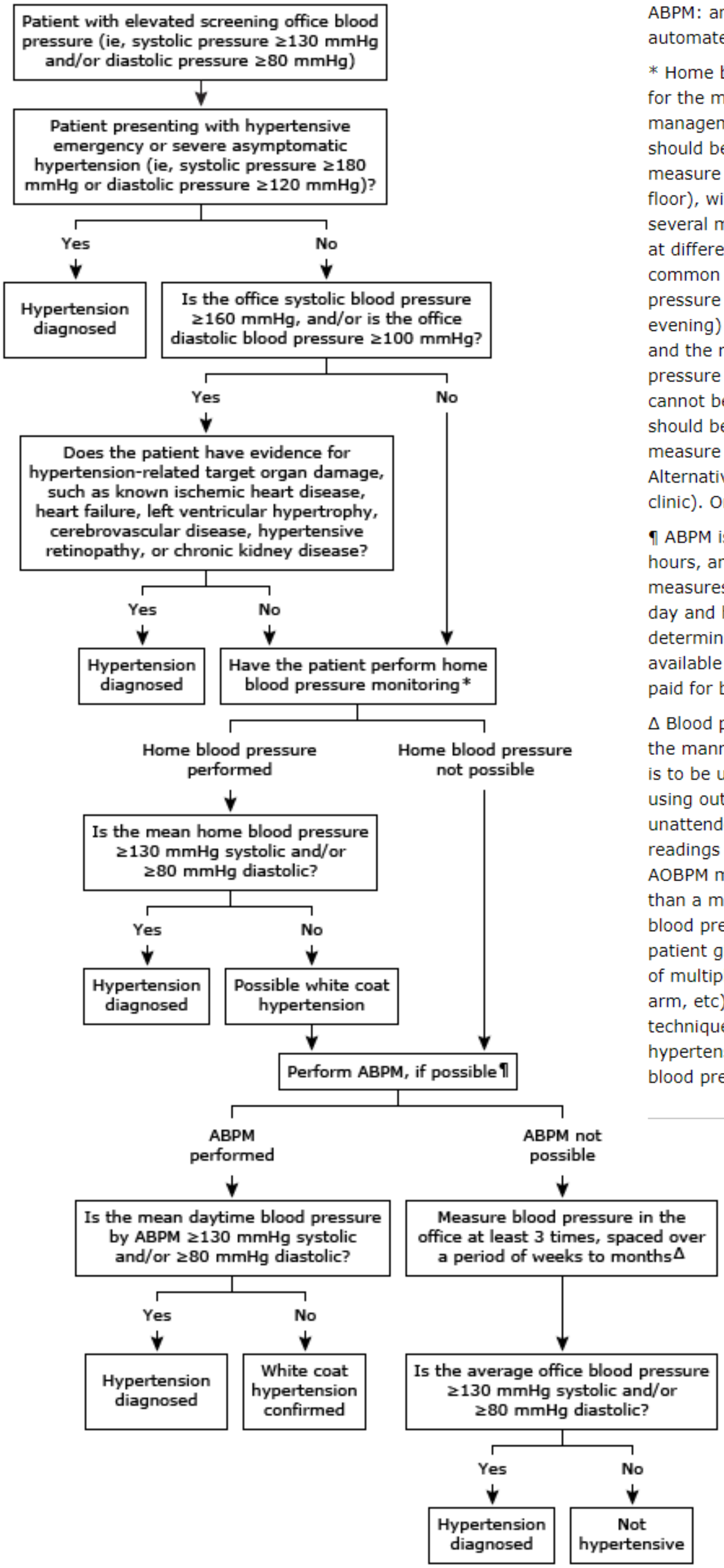
CT = computed tomography.

Adapted with permission from Viera AJ, Neutze DM. Diagnosis of secondary hypertension: an age-based approach. Am Fam Physician. *2010;82(12):1472, with additional information from references 3, 9, 13, and 23 through 28.*



▪ **BY TYPE:** **Guideline**	**Stage**	**Systolic BP**		**Diastolic BP**
JNC 8	**Normal**	<120	AND	<80
	Pre-HTN	120-139	OR	80-89
	HTN stage I	140-159	OR	90-99
	HTN stage II	≥160	OR	≥100
SHMS	**Normal**	<120	AND	<80
	Pre-HTN	120-139	AND/OR	80-89
	HTN Grade I	140-159	AND/OR	90-99
	HTN Grade II	160-179	AND/OR	100-109
	HTN Grade III	≥180	AND/OR	≥110
ACC/AHA	**Normal**	<120	AND	<80
	Elevated	120-129	AND	<80
	HTN Stage I	130-139	OR	80-89
	HTN Stage II	≥140	OR	≥90
	HTN Crisis	>180	AND/OR	>120

Diagnosis of HTN in Adults:


Patient with elevated screening office blood pressure (ie, systolic pressure ≥130 mmHg and/or diastolic pressure ≥80 mmHg)
Patient presenting with hypertensive emergency or severe asymptomatic hypertension (ie, systolic pressure ≥180 mmHg or diastolic pressure ≥120 mmHg)?
Yes
No
Hypertension diagnosed
Is the office systolic blood pressure ≥160 mmHg, and/or is the office diastolic blood pressure ≥100 mmHg?
Yes
No
Does the patient have evidence for hypertension-related target organ damage, such as known ischemic heart disease, heart failure, left ventricular hypertrophy, cerebrovascular disease, hypertensive retinopathy, or chronic kidney disease?
Yes
No
Hypertension diagnosed
Have the patient perform home blood pressure monitoring*
Home blood pressure performed
Home blood pressure not possible
Is the mean home blood pressure ≥130 mmHg systolic and/or ≥80 mmHg diastolic?
Yes
No
Hypertension diagnosed
Possible white coat hypertension
Perform ABPM, if possible¶
ABPM performed
ABPM not possible
Is the mean daytime blood pressure by ABPM ≥130 mmHg systolic and/or ≥80 mmHg diastolic?
Measure blood pressure in the office at least 3 times, spaced over a period of weeks to monthsΔ
Yes
No
Hypertension diagnosed
White coat hypertension confirmed
Is the average office blood pressure ≥130 mmHg systolic and/or ≥80 mmHg diastolic?
Yes
No
Hypertension diagnosed
Not hypertensive

ABPM: ambulatory blood pressure monitoring; AOBPM: automated office blood pressure monitoring.

* Home blood pressure must be performed adequately in order for the measurements to be used for diagnosis and management. To be adequate: The accuracy of the home device should be verified in the clinician's office; the patient should measure their blood pressure while seated (with feet flat on the floor), with arm supported (such as on a table), and after several minutes of rest; the blood pressure should be measured at different times per day and over a series of multiple days. A common strategy is to have the patient measure their blood pressure twice daily (once in the morning and once in the evening) for 7 days. Readings from the first day are discarded, and the remaining 12 measurements are averaged. Home blood pressure should not be used for diagnosis and management if it cannot be performed adequately. Adequate home blood pressure should be possible in most cases. Inexpensive devices to measure blood pressure at home are available over the counter. Alternatively, such devices can be borrowed (eg, provided by the clinic). Only rarely are such devices unavailable or unaffordable.

¶ ABPM is performed by having the patient wear, typically for 24 hours, an electronic blood pressure device that automatically measures the blood pressure, usually every half-hour during the day and hourly at night. We use the mean daytime value to determine the presence of hypertension. ABPM is possible if it is available in the clinic or via an external vendor and if it can be paid for by the patient's insurance or by the patient.

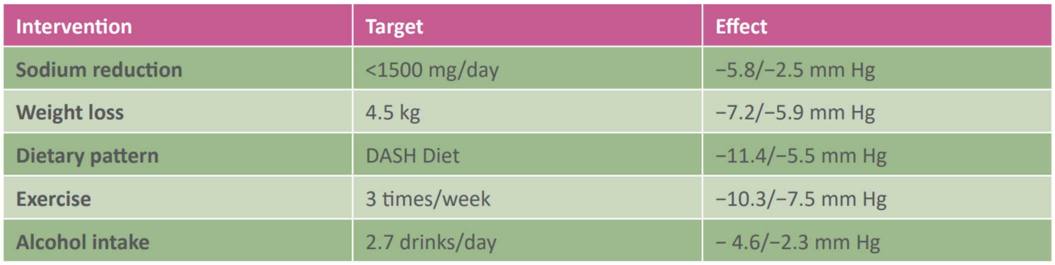
Δ Blood pressure measured in the office may vary according to the manner in which it is obtained. If blood pressure in the office is to be used for the diagnosis of hypertension (rather than using out-of-office blood pressures), we suggest performing unattended AOBPM (using a device that can average multiple readings while the patient sits alone in a room). Unattended AOBPM may provide a measurement that is 5 to 10 mmHg less than a manual measurement (ie, with a stethoscope). Office blood pressure must be performed with proper technique (eg, patient given time to rest, seated with feet flat on the floor, use of multiple measurements, appropriate-sized cuff placed on bare arm, etc). Office blood pressure measured with improper technique **should not** be used for diagnosis and management of hypertension. Refer to UpToDate topics on measurement of blood pressure for details of proper technique.

UpToDate®

Management:

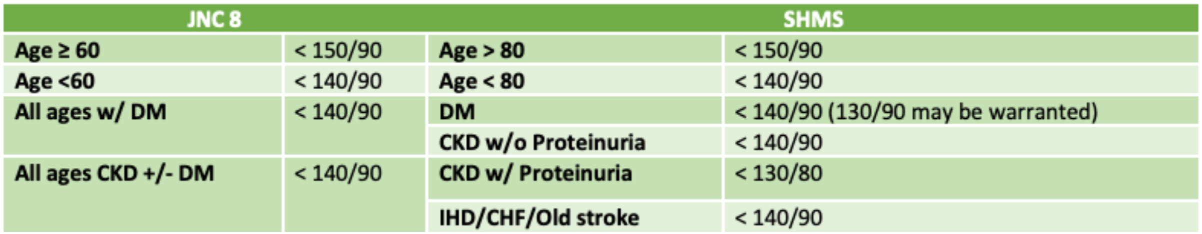
Non-Pharmacological	Pharmacological (1st Line)
• **DASH Diet.** • **Exercise (150 min/week) moderate intensity.** • **Smoking Cessation,.**	• Thiazide diuretics. • Calcium Channel Blockers. • ACE inhibitors. • ARBs.

Impact of Lifestyle Therapies on Blood Pressure in Hypertensive Patients:



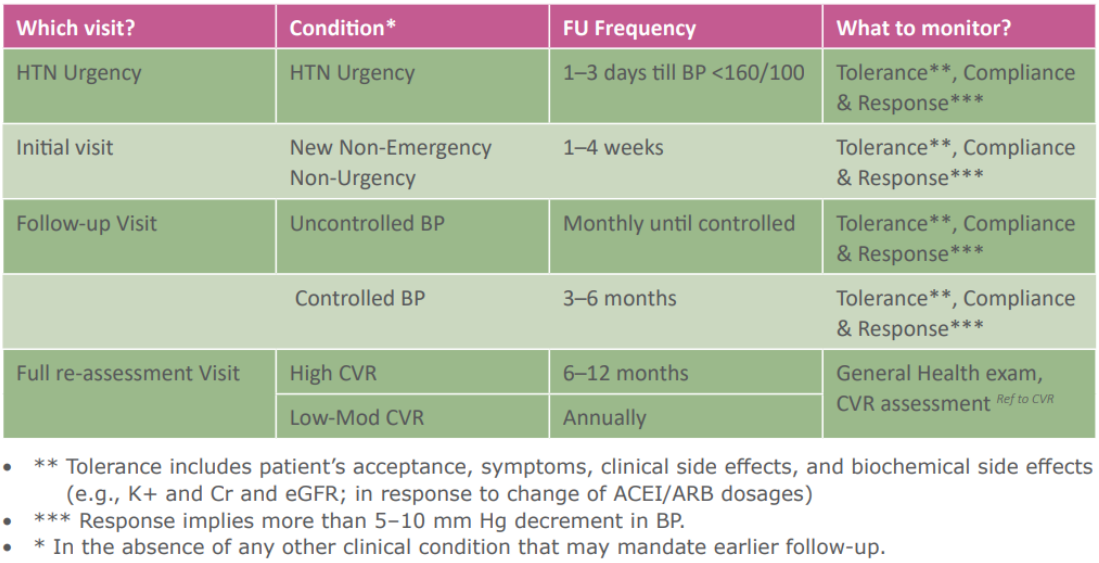
Intervention	Target	Effect
Sodium reduction	<1500 mg/day	−5.8/−2.5 mm Hg
Weight loss	4.5 kg	−7.2/−5.9 mm Hg
Dietary pattern	DASH Diet	−11.4/−5.5 mm Hg
Exercise	3 times/week	−10.3/−7.5 mm Hg
Alcohol intake	2.7 drinks/day	− 4.6/−2.3 mm Hg

Target Blood Pressure:



JNC 8		SHMS	
Age ≥ 60	< 150/90	**Age > 80**	< 150/90
Age <60	< 140/90	**Age < 80**	< 140/90
All ages w/ DM	< 140/90	**DM**	< 140/90 (130/90 may be warranted)
		CKD w/o Proteinuria	< 140/90
All ages CKD +/- DM	< 140/90	**CKD w/ Proteinuria**	< 130/80
		IHD/CHF/Old stroke	< 140/90

Recommended Follow Up (SAMS):



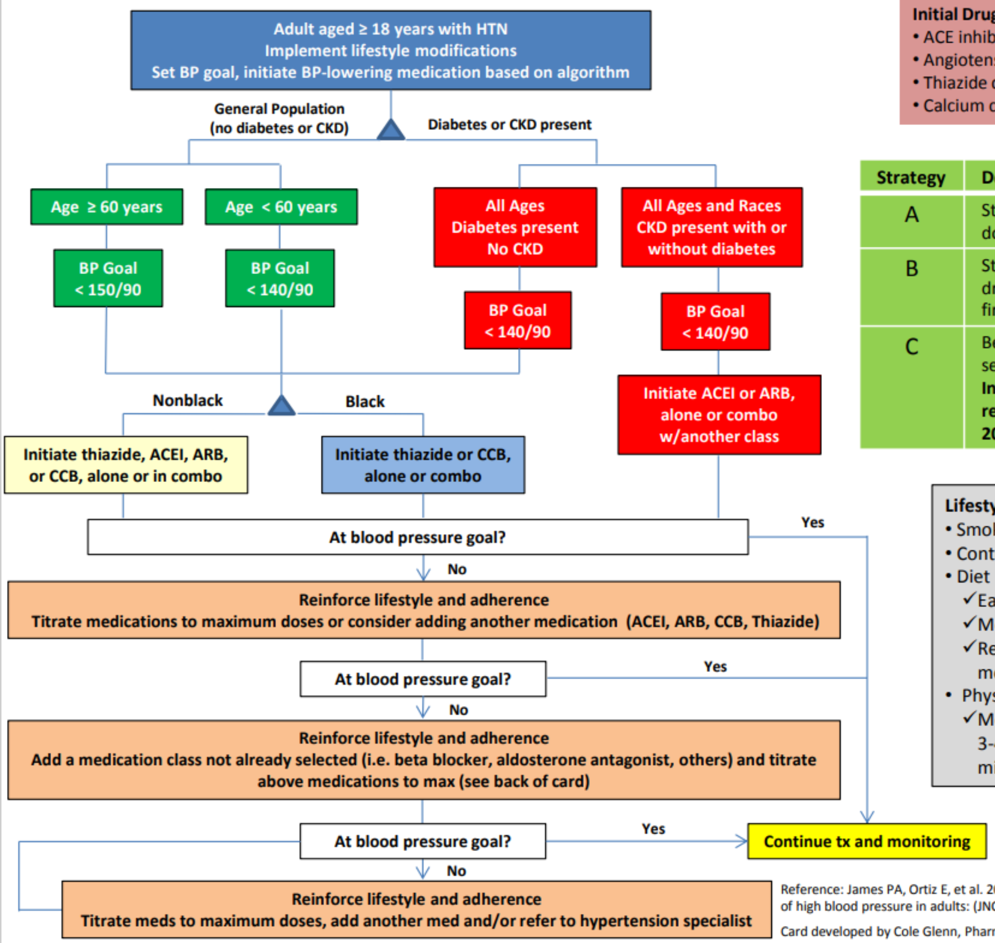
Which visit?	Condition*	FU Frequency	What to monitor?
HTN Urgency	HTN Urgency	1–3 days till BP <160/100	Tolerance**, Compliance & Response***
Initial visit	New Non-Emergency Non-Urgency	1–4 weeks	Tolerance**, Compliance & Response***
Follow-up Visit	Uncontrolled BP	Monthly until controlled	Tolerance**, Compliance & Response***
	Controlled BP	3–6 months	Tolerance**, Compliance & Response***
Full re-assessment Visit	High CVR	6–12 months	General Health exam, CVR assessment Ref to CVR
	Low-Mod CVR	Annually	

- ** Tolerance includes patient's acceptance, symptoms, clinical side effects, and biochemical side effects (e.g., K+ and Cr and eGFR; in response to change of ACEI/ARB dosages)
- *** Response implies more than 5–10 mm Hg decrement in BP.
- * In the absence of any other clinical condition that may mandate earlier follow-up.

Indications for Referral (SHMS):

- Resistant HTN.
- Suspicion of secondary HTN.
- Sudden onset of HTN.
- HTN diagnosed at young age (30 years old).
- Worsening of HTN.
- Malignant HTN.

JNC 8 Hypertension Guideline Algorithm



Adult aged ≥ 18 years with HTN
Implement lifestyle modifications
Set BP goal, initiate BP-lowering medication based on algorithm

General Population (no diabetes or CKD)

- Age ≥ 60 years → BP Goal < 150/90
- Age < 60 years → BP Goal < 140/90
- Nonblack: Initiate thiazide, ACEI, ARB, or CCB, alone or in combo
- Black: Initiate thiazide or CCB, alone or combo

Diabetes or CKD present

- All Ages, Diabetes present, No CKD → BP Goal < 140/90
- All Ages and Races, CKD present with or without diabetes → BP Goal < 140/90
- Initiate ACEI or ARB, alone or combo w/another class

At blood pressure goal? Yes → Continue tx and monitoring. No ↓

Reinforce lifestyle and adherence
Titrate medications to maximum doses or consider adding another medication (ACEI, ARB, CCB, Thiazide)

At blood pressure goal? Yes → Continue tx and monitoring. No ↓

Reinforce lifestyle and adherence
Add a medication class not already selected (i.e. beta blocker, aldosterone antagonist, others) and titrate above medications to max (see back of card)

At blood pressure goal? Yes → Continue tx and monitoring. No ↓

Reinforce lifestyle and adherence
Titrate meds to maximum doses, add another med and/or refer to hypertension specialist

Initial Drugs of Choice for Hypertension
- ACE inhibitor (ACEI)
- Angiotensin receptor blocker (ARB)
- Thiazide diuretic
- Calcium channel blocker (CCB)

Strategy	Description
A	Start one drug, titrate to maximum dose, and then add a second drug.
B	Start one drug, then add a second drug before achieving max dose of first
C	Begin 2 drugs at same time, as separate pills or combination pill. **Initial combination therapy is recommended if BP is greater than 20/10mm Hg above goal**

Lifestyle changes:
- Smoking Cessation
- Control blood glucose and lipids
- Diet
  - ✓Eat healthy (i.e., DASH diet)
  - ✓Moderate alcohol consumption
  - ✓Reduce sodium intake to no more than 2,400 mg/day
- Physical activity
  - ✓Moderate-to-vigorous activity 3-4 days a week averaging 40 min per session.

Reference: James PA, Ortiz E, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: (JNC8). JAMA. 2014 Feb 5;311(5):507-20

Card developed by Cole Glenn, Pharm.D. & James L Taylor, Pharm.D.

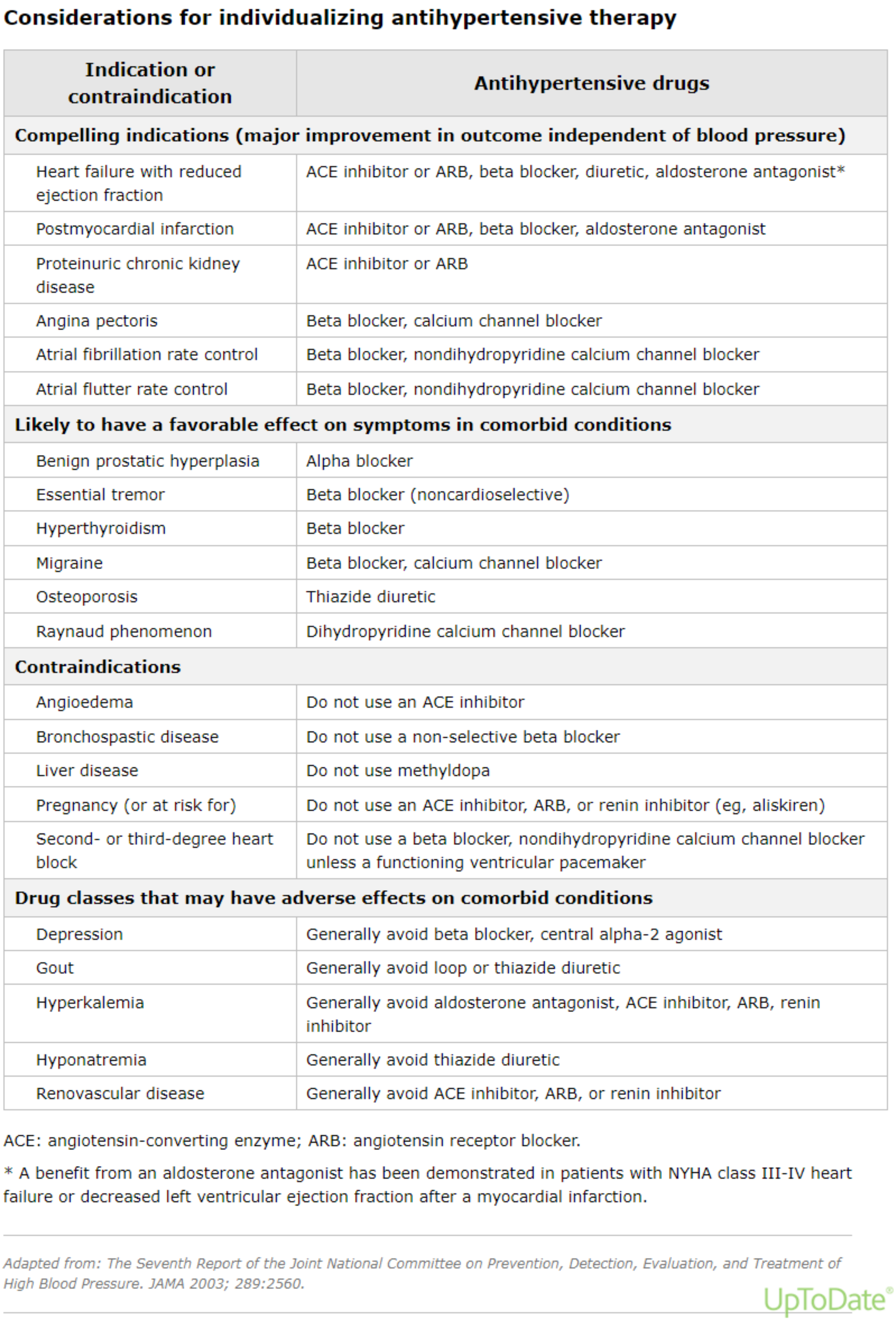
Treatment Approach Algorithm:

Hypertension Treatment

Compelling Indications	
Indication	Treatment Choice
Heart Failure	ACEI/ARB + BB + diuretic + spironolactone
Post –MI/Clinical CAD	ACEI/ARB AND BB
CAD	ACEI, BB, diuretic, CCB
Diabetes	ACEI/ARB, CCB, diuretic
CKD	ACEI/ARB
Recurrent stroke prevention	ACEI, diuretic
Pregnancy	labetolol (first line), nifedipine, methyldopa

Beta-1 Selective Beta-blockers – possibly safer in patients with COPD, asthma, diabetes, and peripheral vascular disease:
- metoprolol
- bisoprolol
- betaxolol
- acebutolol

Drug Class	Agents of Choice	Comments
Diuretics	HCTZ 12.5-50mg, chlorthalidone 12.5-25mg, indapamide 1.25-2.5mg triamterene 100mg *K+ sparing* – spironolactone 25-50mg, amiloride 5-10mg, triamterene 100mg furosemide 20-80mg twice daily, torsemide 10-40mg	Monitor for hypokalemia Most SE are metabolic in nature Most effective when combined w/ ACEI Stronger clinical evidence w/chlorthalidone Spironolactone - gynecomastia and hyperkalemia Loop diuretics may be needed when GFR <40mL/min
ACEI/ARB	*ACEI:* lisinopril, benazapril, fosinopril and quinapril 10-40mg, ramipril 5-10mg, trandolapril 2-8mg *ARB*: candesartan 8-32mg, valsartan 80-320mg, losartan 50-100mg, olmesartan 20-40mg, telmisartan 20-80mg	SE: Cough (ACEI only), angioedema (more with ACEI), hyperkalemia Losartan lowers uric acid levels; candesartan may prevent migraine headaches
Beta-Blockers	metoprolol succinate 50-100mg and tartrate 50-100mg twice daily, nebivolol 5-10mg, propranolol 40-120mg twice daily, carvedilol 6.25-25mg twice daily, bisoprolol 5-10mg, labetalol 100-300mg twice daily,	Not first line agents – reserve for post-MI/CHF Cause fatigue and decreased heart rate Adversely affect glucose; mask hypoglycemic awareness
Calcium channel blockers	*Dihydropyridines*: amlodipine 5-10mg, nifedipine ER 30-90mg, *Non-dihydropyridines*: diltiazem ER 180-360 mg, verapamil 80-120mg 3 times daily or ER 240-480mg	Cause edema; dihydropyridines may be safely combined w/ B-blocker Non-dihydropyridines reduce heart rate and proteinuria
Vasodilators	hydralazine 25-100mg twice daily, minoxidil 5-10mg terazosin 1-5mg, doxazosin 1-4mg given at bedtime	Hydralazine and minoxidil may cause reflex tachycardia and fluid retention – usually require diuretic + B-blocker Alpha-blockers may cause orthostatic hypotension
Centrally-acting Agents	clonidine 0.1-0.2mg twice daily, methyldopa 250-500mg twice daily guanfacine 1-3mg	Clonidine available in weekly patch formulation for resistant hypertension



Considerations for individualizing antihypertensive therapy

Indication or contraindication	Antihypertensive drugs
Compelling indications (major improvement in outcome independent of blood pressure)	
Heart failure with reduced ejection fraction	ACE inhibitor or ARB, beta blocker, diuretic, aldosterone antagonist*
Postmyocardial infarction	ACE inhibitor or ARB, beta blocker, aldosterone antagonist
Proteinuric chronic kidney disease	ACE inhibitor or ARB
Angina pectoris	Beta blocker, calcium channel blocker
Atrial fibrillation rate control	Beta blocker, nondihydropyridine calcium channel blocker
Atrial flutter rate control	Beta blocker, nondihydropyridine calcium channel blocker
Likely to have a favorable effect on symptoms in comorbid conditions	
Benign prostatic hyperplasia	Alpha blocker
Essential tremor	Beta blocker (noncardioselective)
Hyperthyroidism	Beta blocker
Migraine	Beta blocker, calcium channel blocker
Osteoporosis	Thiazide diuretic
Raynaud phenomenon	Dihydropyridine calcium channel blocker
Contraindications	
Angioedema	Do not use an ACE inhibitor
Bronchospastic disease	Do not use a non-selective beta blocker
Liver disease	Do not use methyldopa
Pregnancy (or at risk for)	Do not use an ACE inhibitor, ARB, or renin inhibitor (eg, aliskiren)
Second- or third-degree heart block	Do not use a beta blocker, nondihydropyridine calcium channel blocker unless a functioning ventricular pacemaker
Drug classes that may have adverse effects on comorbid conditions	
Depression	Generally avoid beta blocker, central alpha-2 agonist
Gout	Generally avoid loop or thiazide diuretic
Hyperkalemia	Generally avoid aldosterone antagonist, ACE inhibitor, ARB, renin inhibitor
Hyponatremia	Generally avoid thiazide diuretic
Renovascular disease	Generally avoid ACE inhibitor, ARB, or renin inhibitor

ACE: angiotensin-converting enzyme; ARB: angiotensin receptor blocker.

* A benefit from an aldosterone antagonist has been demonstrated in patients with NYHA class III-IV heart failure or decreased left ventricular ejection fraction after a myocardial infarction.

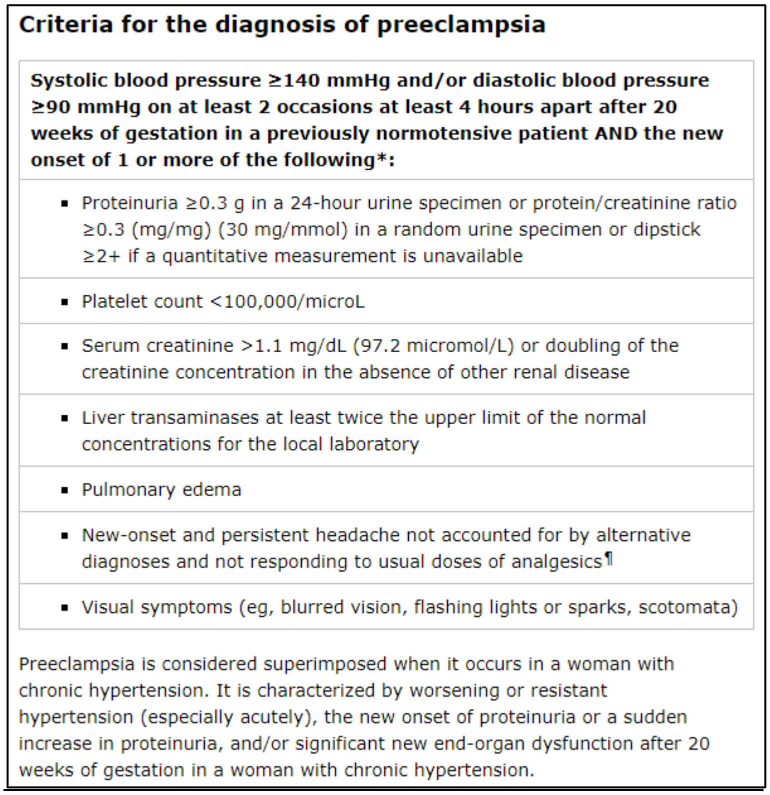
Adapted from: The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. JAMA 2003; 289:2560.

High Blood Pressure and Pregnancy:

Chronic (preexisting) HTN: Hypertension diagnosed or present before pregnancy or on at least two occasions before 20 weeks of gestation. Hypertension that is first diagnosed during pregnancy and persists for at least 12 weeks post-delivery is also considered chronic hypertension.

Gestational HTN: New onset of systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg on at least 2 occasions 4 hours apart after 20 weeks of gestation in a previously normotensive individual.

Preeclampsia:



Criteria for the diagnosis of preeclampsia

Systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg on at least 2 occasions at least 4 hours apart after 20 weeks of gestation in a previously normotensive patient AND the new onset of 1 or more of the following*:

- Proteinuria ≥0.3 g in a 24-hour urine specimen or protein/creatinine ratio ≥0.3 (mg/mg) (30 mg/mmol) in a random urine specimen or dipstick ≥2+ if a quantitative measurement is unavailable
- Platelet count <100,000/microL
- Serum creatinine >1.1 mg/dL (97.2 micromol/L) or doubling of the creatinine concentration in the absence of other renal disease
- Liver transaminases at least twice the upper limit of the normal concentrations for the local laboratory
- Pulmonary edema
- New-onset and persistent headache not accounted for by alternative diagnoses and not responding to usual doses of analgesics¶
- Visual symptoms (eg, blurred vision, flashing lights or sparks, scotomata)

Preeclampsia is considered superimposed when it occurs in a woman with chronic hypertension. It is characterized by worsening or resistant hypertension (especially acutely), the new onset of proteinuria or a sudden increase in proteinuria, and/or significant new end-organ dysfunction after 20 weeks of gestation in a woman with chronic hypertension.

Eclampsia:

In a patient with preeclampsia, a generalized seizure that cannot be attributed to other causes.

HELLP Syndrome:

1. ALT or AST ≥ 2 times upper limit of normal.

2. Hemolysis:

- Lactate dehydrogenase > 600 U per L (10.0 µkat per L).
- Peripheral blood smear shows evidence of damaged erythrocytes (e.g., schistocytes, burr cells, helmet cells).
- Serum bilirubin ≥ 1.2 mg per dL (20.5 µmol per L).

3. Platelet count < 100 × 103 per µL (100 × 109 per L).

For chronic HTN in pregnancy, you can use:

- **Methyldopa**.
- **Labetalol:** Avoided in patients with asthma, heart disease, and congestive heart failure, increase risk of small for gestational age.
- **CCB:** Sustained release long acting nifedipine.
- **Hydralazine:** Causes reflux tachycardia and fluid retention.
- **Thiazide diuretics:** In chronic HTN who were taking them prior to pregnancy.

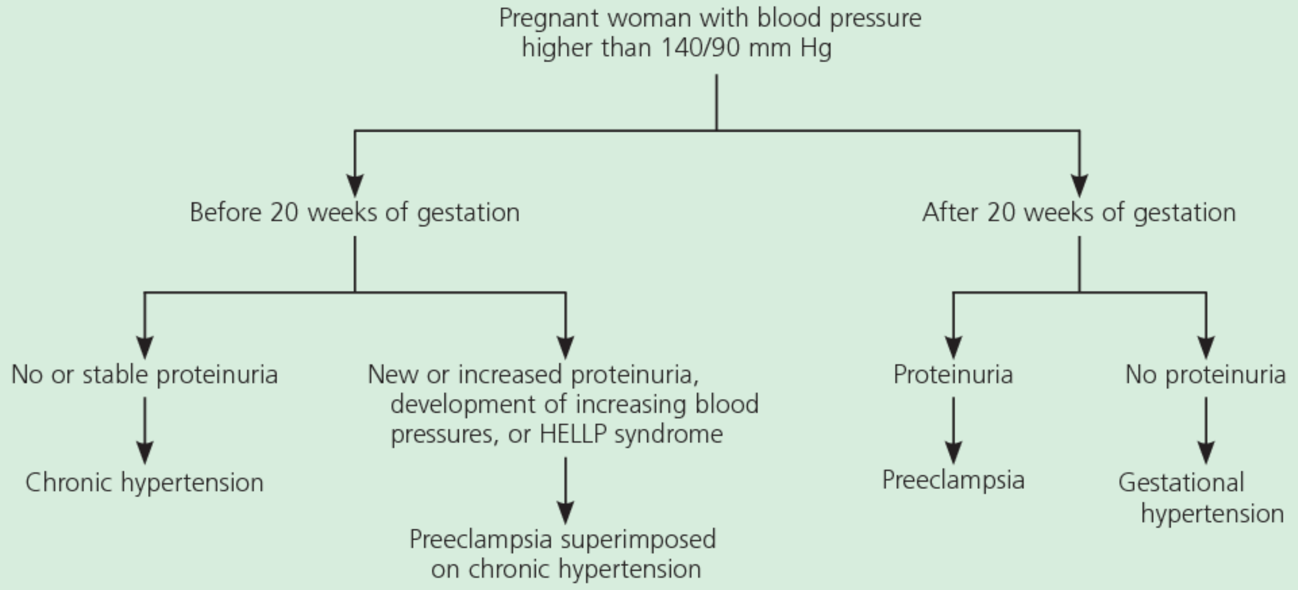
Choice of medications:

ACOG Task Force on Hypertension in Pregnancy recommends labetalol, nifedipine, or methyldopa as first-line therapy. They also suggest avoiding angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, renin inhibitors, and mineralocorticoid receptor antagonists.

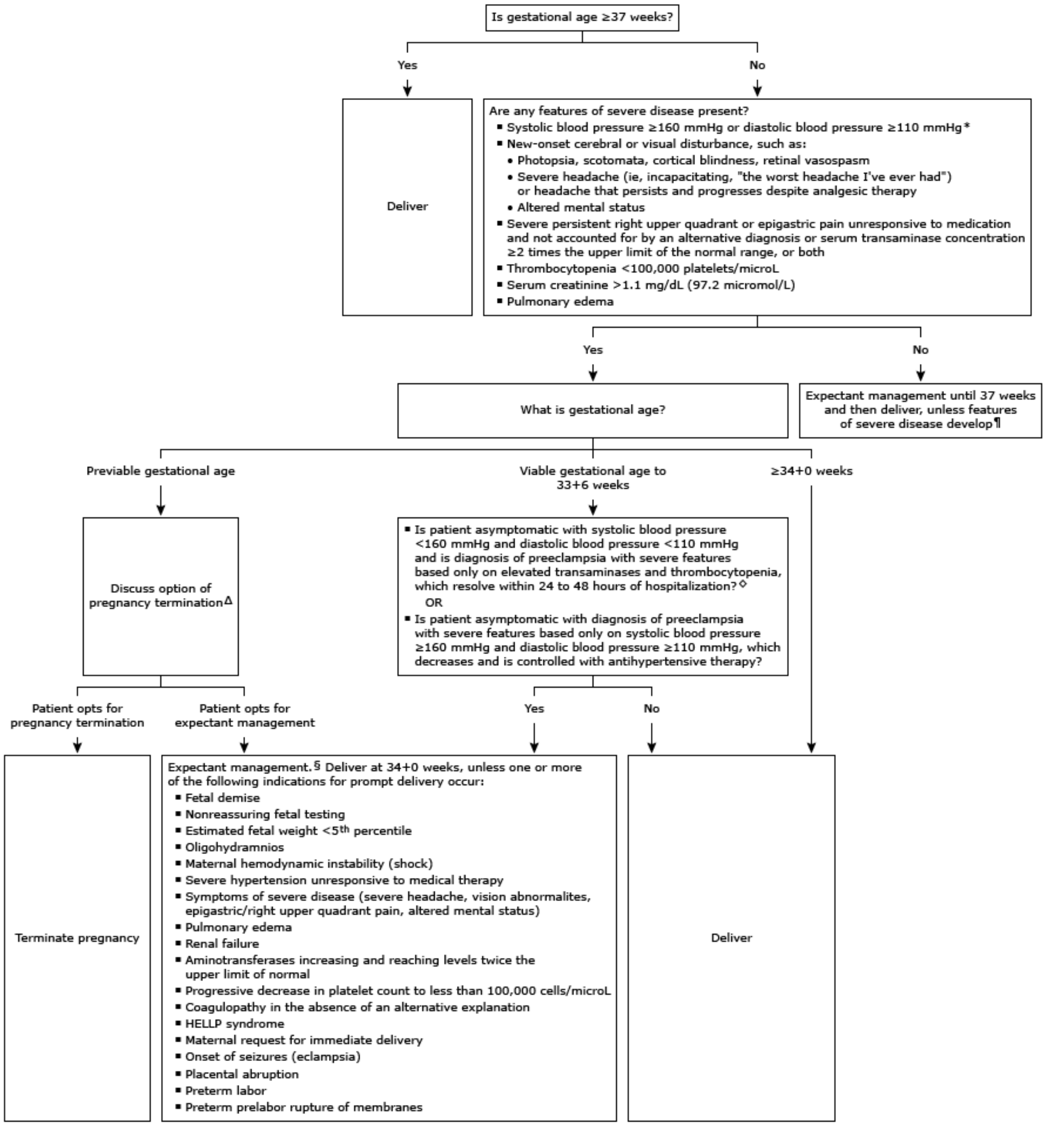
Drugs and breastfeeding:

- BBs, alpha/beta-blockers, calcium channel blockers are compatible with breast feeding.
- ACE inhibitors are transferred into milk at very low levels. Captopril and enalapril have been reviewed by the American Academy of Pediatrics (AAP) and are compatible for use in lactation but should be avoided in newborns susceptible to hemodynamic instability.
- Diuretics may theoretically reduce milk volume, but the AAP considers their use compatible with breast feeding.

Preeclampsia as a Hypertensive Disorder of Pregnancy


Pregnant woman with blood pressure higher than 140/90 mm Hg
Before 20 weeks of gestation
After 20 weeks of gestation
No or stable proteinuria
New or increased proteinuria, development of increasing blood pressures, or HELLP syndrome
Proteinuria
No proteinuria
Chronic hypertension
Preeclampsia superimposed on chronic hypertension
Preeclampsia
Gestational hypertension

Timing of delivery in women with preeclampsia


Yes
No
Yes
No
Previable gestational age
Viable gestational age to 33+6 weeks
≥34+0 weeks
Patient opts for pregnancy termination
Patient opts for expectant management
Yes
No

Is gestational age ≥37 weeks?

Deliver

Are any features of severe disease present?
- Systolic blood pressure ≥160 mmHg or diastolic blood pressure ≥110 mmHg*
- New-onset cerebral or visual disturbance, such as:
  - Photopsia, scotomata, cortical blindness, retinal vasospasm
  - Severe headache (ie, incapacitating, "the worst headache I've ever had") or headache that persists and progresses despite analgesic therapy
  - Altered mental status
- Severe persistent right upper quadrant or epigastric pain unresponsive to medication and not accounted for by an alternative diagnosis or serum transaminase concentration ≥2 times the upper limit of the normal range, or both
- Thrombocytopenia <100,000 platelets/microL
- Serum creatinine >1.1 mg/dL (97.2 micromol/L)
- Pulmonary edema

What is gestational age?

Expectant management until 37 weeks and then deliver, unless features of severe disease develop¶

Discuss option of pregnancy terminationΔ

- Is patient asymptomatic with systolic blood pressure <160 mmHg and diastolic blood pressure <110 mmHg and is diagnosis of preeclampsia with severe features based only on elevated transaminases and thrombocytopenia, which resolve within 24 to 48 hours of hospitalization?◊

  OR
- Is patient asymptomatic with diagnosis of preeclampsia with severe features based only on systolic blood pressure ≥160 mmHg and diastolic blood pressure ≥110 mmHg, which decreases and is controlled with antihypertensive therapy?

Terminate pregnancy

Expectant management.§ Deliver at 34+0 weeks, unless one or more of the following indications for prompt delivery occur:
- Fetal demise
- Nonreassuring fetal testing
- Estimated fetal weight <5th percentile
- Oligohydramnios
- Maternal hemodynamic instability (shock)
- Severe hypertension unresponsive to medical therapy
- Symptoms of severe disease (severe headache, vision abnormalites, epigastric/right upper quadrant pain, altered mental status)
- Pulmonary edema
- Renal failure
- Aminotransferases increasing and reaching levels twice the upper limit of normal
- Progressive decrease in platelet count to less than 100,000 cells/microL
- Coagulopathy in the absence of an alternative explanation
- HELLP syndrome
- Maternal request for immediate delivery
- Onset of seizures (eclampsia)
- Placental abruption
- Preterm labor
- Preterm prelabor rupture of membranes

Deliver

Women with suspected preeclampsia should be admitted to the hospital to confirm the diagnosis; assess severity; closely monitor maternal and fetal status; initiate supportive, therapeutic, and prophylactic therapies (eg, antihypertensive drugs for treatment of severe hypertension, antenatal corticosteroids, magnesium sulfate to prevent maternal seizures and, in some cases, fetal/neonatal neuroprotection); and either undergo delivery or expectant management in the hospital until delivery. Refer to UpToDate topics on Preeclampsia: Management and prognosis and Expectant management of preterm preeclampsia with severe features.

HELLP: hemolysis, elevated liver enzymes, low platelet count; AST: aspartate aminotransferase; ALT: alanine aminotransferase.

* Blood pressure should be evaluated on at least 2 occasions at least 4 hours apart. However, if systolic pressure is ≥160 mmHg or diastolic pressure is ≥110 mmHg, confirmation after a short interval, even within a few minutes, is acceptable to facilitate timely initiation of antihypertensive therapy.

¶ In patients with no severe features of preeclampsia, guidelines from major medical organizations generally recommend expectant management before 34 weeks of gestation. There is less consensus about the optimum approach at 34+0 to 36+6 weeks. Although there are serious maternal risks with expectant management, we believe it is reasonable in fully informed patients because the absolute maternal risk of an adverse outcome is low and, although there is no benefit to the mother of continuing the pregnancy, the neonatal benefits from the additional time for in utero growth and maturation are substantial.

Δ If onset of preeclampsia with severe features is at a previable gestational age, we offer termination of pregnancy to reduce the mother's risk of developing life-threatening morbidity (eg, cerebrovascular hemorrhage) and to prevent the birth of an infant at the limit of viability and thus at high risk of death or severe permanent disability. Factors critical in making this decision are the estimated fetal weight, actual gestational age, presence of growth restriction, and the neonatologist's judgment of the neonatal prognosis.

◊ In otherwise asymptomatic or mildly hypertensive women with features of severe disease by laboratory criteria, it is reasonable to delay delivery, administer antenatal corticosteroids, and repeat the laboratory tests (AST, ALT, platelet count) every 6 to 8 hours while the patient is on the labor unit to see if they improve. We would promptly deliver patients with worsening liver chemistries or falling platelet counts and those who develop other signs of preeclampsia with severe features. We often continue expectant management if the initially abnormal laboratory test results remain stable, but this decision is made on a case-by-case basis.

§ These patients should be hospitalized and cared for by, or in consultation with, a maternal-fetal medicine specialist. Such an approach should be undertaken only at facilities with adequate maternal and neonatal intensive care resources. After initial observation on the labor unit, these patients are closely monitored on an antepartum unit. See UpToDate topic on Expectant management of preterm preeclampsia with severe features.

In the following pages, a summary of HTN medications adapted from FM residency program at KSUMC

Family Medicine Residency Program at KSUMC

ACE inhibitors

Medications & Doses (Mg/day)

- Captopril 12.5-150 BID-TID **(Multiple times a day, Good for rapid reduction).**
- Enalapril 5-40 OD-BID.
- Fosinopril 10-40 OD **(The safest in CKD).**
- Lisinopril 10-40 OD.
- Perindopril 4-16 OD.
- Ramipril 2.5-10 OD-BID.

Doses higher than therapeutic dose have minimal effect & more side effects.

Indications:

HTN, CHF, MI
Diabetic nephropathy
Chronic renal insufficiency.

Monitoring:

Basic Metabolic Panel

Absolute Contraindications:

- ARBs or direct renin inhibitors.
- Previous angioedema with ACE Inhibitor
- Bilateral renal artery stenosis.
- Pregnancy.

Relative Contraindications

- Aortic stenosis.
- Hypertrophic cardiomyopathies.

Mechanism of Action:

It prevents the conversion of angiotensin I to angiotensin II, which disrupts the renin-angiotensin-aldosterone system (RAAS) resulting in inhibition of Na & water retention.

Clinical outcomes:

↓ MI 20%, reinfarction 25%, ESRD, angina, stroke 32%, hospitalization, morbidity and mortality associated with heart failure 22%.

Considerations and Adverse Effects

Renal insufficiency

- Baseline serum Cr up to 3 mg/dL is safe.
- Serum K and Cr level should be monitored closely during the first four weeks.
- Start with a low dosage and titer slowly.
- Progressive increase of serum Cr or deterioration of eGFR is considered high risk.
- **Consider nephrologist referral if serum Cr Increased by >20% and discontinue ACEI if serum Cr increased by >30%.**

HYPOTENSION

- Correct underlying problem in patients with: hypovolemia, hyponatremia, acute CHF, patients on vasodilators, or dialysis.
- Start with a low dosage and titer slowly.
- Patients with high plasma renin levels may develop transient first-dose hypotension.
- **Re-challenge the patient at 50% the previous dose. If they are taking a diuretic, reduce or hold ACE-I for 3d before reattempting therapy.**

Dry Cough

- Due to inhibition of kininase II -> accumulation of kinins, substance P and PGs.
- Tickling or scratching sensation in the throat.
- Happens in 10% of patients, not dose related.
- Women > Men, Blacks > whites.
- Develops within days to months of initiation, resolves within 1-4 wks after discontinuation.
- Not a reason to discontinue treatment **unless the patient cannot tolerate it.**

HYPERKALEMIA

- K levels should be monitored carefully in patients at risk.
- Up to 5 % of patients experience serum K levels greater than 5.7 mEq/L, **if levels remain higher than that on repeat testing, ACE inhibitor therapy should be discontinued.**

TERATOGENICITY

ACE inhibitors are not teratogenic if discontinued during the first trimester (class C), **but they are considered teratogenic in the second and third trimesters (class D).**

Angioneurotic edema

- In 0.1 to 0.2 %, within the first week of therapy but can occur at any time.
- a life-threatening to any patient with a history of angioneurotic edema, **those patients should not be given an ACE inhibitor.**
- **Occurs mostly with Enalapril.**

Equivalent Doses

Captopril	Enalapril	Lisinopril	Perindopril
25 mg daily	5 mg daily	5 mg daily	2.5 mg daily
50-75 mg daily	10 mg daily	10 mg daily	5 mg daily
100 mg daily	20 mg daily	20 mg daily	10 mg daily
150 mg daily	40 mg daily	40 mg daily	

AHA - 2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults
AHA - Angiotensin-converting Enzyme Inhibitors for Stroke Prevention
MOH - Equivalent Doses by Ph.Salman AlMalki
AAFP - Using ACE Inhibitors Appropriately
BMJ best practice
Pubmed

Done by:
Dr.Samaher AlSaad - KSUMC Family Medicine Resident
Dr.Razan AlHadlaq - KSMC Family Medicine Resident
Supervised by: Dr.Abdulaziz AlOdhayani - Assistant Professor, Consultant Family Medicine at KSUMC

ARBs

Medications & Doses (mg/day)

- Azilsartan 40-80 OD **(Best HTN control).**
- Candesartan 8-32 OD **(does not induce cough)**
- Irbesartan 150-300 OD.
- Losartan 50-100 OD-BID **(lowers chances of stroke).**
- Olmesartan 20-40 OD.
- Telmisartan 20-80 OD **(improves insulin sensitivity).**
- Valsartan 80-320 OD. **(improves HF outcomes).**

Indications:

Patients with HTN, CHF, MI, diabetic nephropathy,chronic renal insufficiency who can not tolerate ACE-I

Monitoring:

Basic Metabolic Panel

Absolute Contraindications:

- ACE inhibitors or direct renin inhibitors
- Hypovolemia.
- History of angioedema with ARBs.
- Bilateral renal artery stenosis.
- Pregnancy.
- hypersensitivity to ARBs

Relative Contraindications

- History of angioedema with ACE-Is.

Mechanism of Action:

Blockage of angiotensin II receptor causes vasodilatation, reduces aldosterone, catecholamine, & vasopressin release that results in lowering BP

Clinical outcomes:

Reduce the risk of stroke 10%, heart failure13%, and new onset DM 15%. ACE-Is are superior to ARBs in reducing hospitalization and mortality. ARBs and ACEI have similar effect in reducing the progression of micro/macro albuminuria in diabetic nephropathy in both hypertensive and normotensive patients.

Interactions and Adverse Effects

The side effect profile is generally similar to that seen with ACE inhibitors (hyperkalemia, acute renal injury, renal dysfunction, syncope)

ANGIOEDEMA

- ARBs have lower rates of angioedema than ACE inhibitors.
- **Patients with a history of angioedema with an ACEI can receive an ARB beginning 6 weeks after ACEI discontinued.**

Dry Cough

The incidence of cough is lower in patients treated with ARBs 3.2% than ACE-I 10%.

PREGNANCY

- **They are considered teratogenic in the second and third trimesters.**
- **should not be taken by patients who are breast-feeding.**

HYPOTENSION

- ARBs have higher rate of hypotensive symptoms than ACE inhibitors.
- Dizziness occurs in 2-4% of patients taking ARBs associated with a first-dose hypotension in <1%.
- Start with a low dosage and titer slowly.
- **Discontinuation is required if patient develops sever hypotensive symptoms.**

ENTEROPATHY

"sprue-like enteropathy" (severe chronic diarrhea & weight loss) occurs months to years after **Olmesartan** initiation. **Discontinuation is required if these symptoms occur.**

Infrequent Adverse Effects

Nausea, headache, URTI, back pain, dyspepsia, nasal congestion, sinusitis, pharyngitis. Elevated LFTs and serum bilirubin concentrations.

ARBs COMBINATIONS:

Irbesartan+Hydrochlorthiazide (**CoAprovel**).

Losartan+Hydrochlorthiazide (**Cozaar Comp**).

Olmesartan+Hydrochlorthiazide (**Olmetec Plus**).

Telmisartan+Hydrochlorthiazide (**Micardis Plus**).

Valsartan+Hydrochlorthiazide (**Co-Diovan**).

Drug Interaction

- Multiple drug interactions with losartan **(metabolized by cytochrome P450).**
- Losartan+cimetidine: **18% increase in losartan** bioavailability
- Losartan+rifampin: **20% reduction in losartan** bioavailability
- Telmisartan+digoxin: **20% increase in digoxin** plasma levels.
- ARBs+NSAIDS: **decrease ARBs** effects and **increased risk of worsening of renal function**.

Equivalent Doses

Valsartan	Candesartan	Irbesartan	Losartan
	4 mg daily	75 mg daily	50 mg daily
40 mg daily	8 mg daily	150 mg daily	100 mg daily
80 mg daily	16 mg daily	300 mg daily	

AHA - 2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults
Uptodate - Major side effects of angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers
MOH - Equivalent Doses by Ph.Salman AlMalki
BMJ best practice
Pubmed
AAFP

Done by:
Dr.Samaher AlSaad - KSUMC Family Medicine Resident
Dr.Razan AlHadlaq - KSMC Family Medicine Resident
Supervised by: Dr.Abdulaziz AlOdhayani - Assistant Professor, Consultant Family Medicine at KSUMC

Family Medicine Residency Program at KSUMC

CCB

Mechanism of Action:

Inhibit L-type Ca channel on cells:

- Dihydropyridines are predominantly vasodilators and have less chronotropic and inotropic effects
- Non-dihydropyridines are less potent vasodilators and slow cardiac contractility and conduction.

Indications:

Hypertension (dihydropyridines)
Rate control and coronary artery disease (nondihydropyridines) in patients who can not take B-blockers.
Raynaud phenomenon

Monitoring:

ECG

Non-dihydropyridines Contraindications:

- Heart block
- Bradycardia
- Acute decompensated HFrEF
- Sick sinus syndrome
- Beta blockers

Clinical outcomes:

- CCBs reduce stroke more than placebo and β-blockers.
- Increased risk for acute MI and mortality after acute MI with short-acting agent
- Decreased mean proteinuria by 30 percent with non-dihydropyridines

Considerations:

- Short-acting dihydropyridine CCB should generally be avoided.
- Long-acting agents appear to be safe and effective in treating hypertension and reducing cardiovascular events.
- CCBs should be used cautiously with beta blocker

Dihydropyridines Adverse Effects

- Headache.
- Flushing.
- Hypotension
- Reflex tachycardia
- Peripheral edema in 20%.**(Reduce CCB dose, switch to non-dihydropyridine, or add ACE inhibitor or ARB)**

Overdose

Drowsiness and confusion
Hypotension and bradycardia
Signs of HF
PR interval prolongation
Hyperglycemia
Diltiazem and verapamil are the most cardiotoxic

Medications & Doses (mg/day)

CCB— dihydropyridines

Amlodipine 2.5–10 OD **(safe with HFrEF)**
Felodipine 5–10 OD **(safe with HFrEF)**
Isradipine 5–10 BID
Nicardipine SR 5-20 OD
Nifedipine LA 60-120 OD **(increase mortality after MI)**
Nisoldipine 30-90 OD

Non-dihydropyridines Adverse Effects

- Constipation in 25%
- Bradycardia and AV block
- Systolic HF and worsening cardiac output

Both can lead to gingival hyperplasia

Equivalent Doses

Amlodipine	Felodipine	Nifedipine
2.5 mg	2.5 mg	20 mg
5 mg	5 mg	30-40 mg
10 mg	10 mg	60-90 mg

CCB— nondihydropyridines

Diltiazem SR 180-360 BID
Diltiazem ER 120-480 OD
Verapamil IR 40-80 TID
Verapamil SR 120-480 BID
Verapamil-delayed onset ER 100-480 OD (Evening)
(Termination of SVT, a fib, atrial tachycardia, and atrial flutter - preferred for ER HTN)

Dual combination therapy:

CCB + ACE:
Lotrel (Amlodipine/benazepril)
Lexxel (Enalapril/felodipine extended-release)
Tarka (Trandolapril/verapamil extended-release)

CCB + ARB:
Exforge (amlodipine/ valsartan)
Azor (Amlodipine / Olmesartan)
Twynsta (Telmisartan / Amlodipine)

Triple combination therapy:

CCB + ARB + Diuretic:
Exforge HCT (amlodipine/ valsartan/hydrochlorothiazide)
Ribenzor (Olmesartan, Amlodipine, and Hydrochlorothiazide)

Other combination therapy:

CCB + Statin:
Caduet (amlodipine/atorvastatin)

AHA - 2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults
Uptodate - Calcium channel blocker poisoning
Uptodate - Choice of drug therapy in primary (essential) hypertension
Uptodate - Major side effects and safety of calcium channel blockers
Uptodate - Calcium channel blockers in heart failure with reduced ejection fraction
Uptodate - Antihypertensive therapy and progression of nondiabetic chronic kidney disease in adults
AAFP

Done by:
Dr.Samaher AlSaad - KSUMC Family Medicine Resident
Dr.Razan AlHadlaq - KSMC Family Medicine Resident
Supervised by: Dr.Abdulaziz AlOdhayani - Assistant Professor, Consultant Family Medicine at KSUMC

Beta Blockers

Clinical outcomes:
- Help controlling BP in HFpEF.
- Decrease all cause mortality by 65% with carvidilol and 34% with bisoprolol or metoprolol in CHF patients.
- In **STEMI pre-reperfusion**, 14% reduction in all-cause mortality,13% CV mortality reduction, 22% MI reduction, and 12% angina reduction.
- In **STEMI reperfusion**, 28% MI reduction and 20% angina reduction. 10% increased risk of HF and a 29% increased risk of cardiogenic shock.

Indications:

CAD, Long term management CHF, Rate control, Hyperthyroidism.

Monitoring:

ECG

Absolute Contraindications:
- Acute decompensated CHF exacerbation

Relative Contraindications:
- Asthma or emphysema
- Heart rate < 60 bpm
- Systolic blood pressure < 100 mm Hg
- Second- or third-degree heart block **especially with digoxin or CCB**
- Peripheral vascular disease

Mechanism of Action:

Bind to beta-adrenoceptors and block the binding of norepinephrine and epinephrine to receptors. This inhibits normal sympathetic effects. (sympatholytic)

Considerations:

Bisoprolol, metoprolol & Carvedilol preferred **in patients with HFrEF<40**

Beta-blockers are avoided in the first half of pregnancy due to concerns about IUGR and are viewed as **third line antihypertensive agent.**

Adverse Effects

Cardiac adverse effects:
- **Heart failure**
  - Should not be administered as new therapy **in acute decompensated HF.**
  - HF patients already on BB can continue the therapy if there is decompensated HF.
  - Dizziness in HF due to hypotension and bradycardia **does not necessitate withdrawal of drug therapy.**

Noncardiac adverse effects:
- **Exacerbation of bronchospastic disease.** Beta-1 selective blockers are safe and well tolerated.
- **Depression, fatigue & sexual dysfunction**.
- Beta-Blockers may **mask symptoms of hypoglycemia in people with diabetes. Less prominent with beta-1 selective and ISA.**
- **Hyperkalemia:** rare unless associated with marked potassium load, marked exercise, hypoaldosteronism, HF exacerbation, ESRD or renal transplant. **Most likely to occur with nonselective beta blockers.**
- **Antinuclear antibodies:** Beta blockers have been associated with the development of asymptomatic ANA **which resolve after therapy cessation.**
- Blood lipid changes (Decrease HDL and increase Triglycerides) and weight gain.
- **Sleep disturbances and vivid dreams:** with lipophilic beta blockers (propranolol, metoprolol).
- **Exacerbation of sever peripheral artery disease** with nonselective beta blockers.Patient may develop worsening claudication, cold extremities, absent pulses, Raynaud's phenomenon, cyanosis and gangrene. **Less prominent with beta-1 selective and ISA.**

Overdose

Bradycardia, hypotension, low cardiac output, cardiac failure, cardiogenic shock, bronchospasm and respiratory depression. High dose glucagon is the first line antidote.

Beta-Blockers Withdrawal

Acute withdrawal can lead to accelerated angina, MI or sudden death but are **unusual with long-acting Beta-Blockers.**To avoid withdrawal syndrome:
- **Short acting beta blockers:** patients should take their usual dose OD for 1 wk, then every other day for 1 wk, then the medication can be stopped.
- **Long acting beta blockers:** patients should take half their usual dose OD for 1 wk, then every other day for 1 wk, then the medication can be stopped. Withdrawal can be in less time if needed by taking half the usual dose every other day for 1 wk.

Equivalent Doses

Propranolol	Metoprolol	Carvedilol	Bisoprolol	Atenolol
7.5 mg	100 mg	25 mg	5 mg	mg 50
Beta-1,2	Beta-1	Beta-1,2	Beta-1	Beta-1

Medications & Doses (mg/day)

Cardioselective

Cardioselective:
Atenolol 25-100 OD-BID.
Betaxolol 5-20 OD.
Bisorolol 2.5-10 OD.
Metoprolol tartrate 100-400 BID.
Metoprolol succinate 50–200 OD.
Cardioselective and vasodilatory:
Nebivolol 5–40 OD.

Noncardioselective

Nadolol 40-120 OD.
Propranolol IR 160-480 BID.
Propranolol LA 80-320 OD.

Combined alpha- and beta-receptor

Carvedilol 12.5-50 BID **(with type 2 DM).**
Carvedilol phosphate 20-80 OD.
Labetalol 200-800 BID **(safe in pregnancy)**

Intrinsic sympathomimetic activity

Acebutolol 200-800 BID.
Carteolol 2.5-10 OD.
Penbutolol 10-40 OD.
Pindolol 10-60 BID **(less likely to impair myocardial function in HF).**
- **Generally avoid, especially in patients with IHD or HF.**

AHA - 2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults
Uptodate - Major side effects of beta blockers
MOH - Equivalent Doses by Ph.Salman AlMalki
BMJ best practice
Medscape
Pubmed
AAFP

Done by:
Dr.Samaher AlSaad - KSUMC Family Medicine Resident
Dr.Razan AlHadlaq - KSMC Family Medicine Resident
Supervised by: Dr.Abdulaziz AlOdhayani - Assistant Professor, Consultant Family Medicine at KSUMC

جامعة الملك سعود
King Saud University

Family Medicine Residency Program at KSUMC

Thiazides

Mechanism of Action:

Thiazides: Inhibition of the Na+/Cl– cotransporter in renal distal convoluted tubule resulting in decrease sodium reabsorption and increase in fluid loss to urine.

Indapamide: has a limited diuretic activity as well as anti-vasoconstrictive effect resulting in decrease peripheral vascular resistance.

Indications:

Hypertension, CHF, edema by HF, cirrhosis, CKD, corticosteroid, and nephrotic syndrome.

Contraindications:

Gout, Hypokalemia, Hypercalcemia

Monitoring:

- Measure serum sodium, potassium, and creatinine once within the first one to two weeks after initiating treatment and again after 6 to 12 months.
- Most of metabolic complications develop during the first two to three weeks of therapy except for hyponatremia may occur much later and therefore requires ongoing monitoring.

Clinical outcomes:

In a patient with hypertension and osteoporosis, thiazides have a beneficial effect on bone mineral density.

Chlorthalidone and indapamide have been shown to prevent and reduce cardiovascular events including heart failure and stroke.

Considerations:

After initiation of thiazides, BP begins to fall within the first week and continue for as long as 12 weeks.

Thiazides are not effective antihypertensive in renal insufficiency. If GFR < 30, furosamide may be considered as alternative.

Adverse Effects

Dose-dependent:

High doses >= 50 mg may have greater risk of electrolytes disturbance with minimal clinical efficacy compared to low doses <= 25 mg

- Hyponatremia: In mild asymptomatic, restrict free-water intake, replace K loss, withhold or switch to loop diuretic. In severe hyponatremia, slow Na level correction is necessary.
- Hypokalemia: Common during the first days of high-dose thiazides. **In significant hypokalemia, switch to K-sparing diuretics or spironolactone**

Adverse Effects

Dose-dependent:

- Hyperuricemia: Allopurinol should not be routinely started for asymptomatic hyperuricemia. If a gout attack occurs, **thiazides should be temporarily discontinued and allopurinol should be given.**
- Hyperlipidemia: Less with thiazide-like diuretics. 5-10% Increase of total cholesterol and LDL. 5-15% Increase of triglyceride level.

Adverse Effects

Dose-dependent:

- Hypomagnesemia: prolonged use reduces plasma Mg2+ by 5-10%. Mild hypomagnesemia can be corrected by dietary Mg^{2+}. Parenteral Mg^{2+} in emergency or severe hypomagnesemia.
- Hyperglycemia: Clinically insignificant in low doses and doesn't need close monitoring.

Non-dose-dependent: sexual dysfunction and sleep disturbance

Medications & Doses (mg/day)

Thiazides:
Hydrochlorothiazide 25-50 OD

Thiazide like diuretics:
Chlorthalidone 12.5-25 OD **(Primary hypertension, reduce CVD)**
Indapamide 1.25-2.5 OD **(Alternative to chlorthalidone)**
Metolazone 2.5-10 OD
(Typically used at low doses to minimize metabolic complications)

Thiazides Vs Thaizide-like-duiretics

Thiazides:

- More commonly available in combination products

Thaizide-like-duiretics:

- Longer half-life/duration of action
- Greater effect on blood pressure

Equivalent Doses

Chlorthalidone	Hydrochlorothiazide	Indapamide
12.5 mg	25 mg	2.5 mg

Dual combination therapy:

Thiazides + CCB: Moduretic (Amlodipine/ hydrochlorothiazide 5/50 mg)

Thiazides + K sparing:
Aldactazide (Spironolactone/hydrochlorothiazide 25-50/50 mg)

Thiazides + BB:
Tenoretic (Atenolol/chlorthalidone 50-100/25 mg)
Ziac (Bisoprolol/hydrochlorothiazide 5-10/6.25 mg)
Lopressor (Metoprolol/hydrochlorothiazide 50/25 mg)
Inderide (Propranolol/hydrochlorothiazide 40/25 mg)

Dual combination therapy:

Thiazides + ACE-I:
Vaseretic (Enalapril/hydrochlorothiazide 10/25 mg)
Prinzide (Lisinopril/hydrochlorothiazide 10-20/12.5 mg, 20/25 mg)

Thiazides + ARB:
Hyzaar (Losartan/hydrochlorothiazide 50/12.5 mg, 100/25 mg)
Diovan HCT (Valsartan/hydrochlorothiazide 80-160/12.5 mg)

Triple combination therapy:

CCB + ARB + Diuretic:
Exforge HCT (amlodipine/ valsartan/ hydrochlorothiazide)
Ribenzor (Olmesartan/Amlodipine/ Hydrochlorothiazide)

Other combination therapy:

Combipres (Clonidine/chlorthalidone)
Apresazide (Hydralazine/hydrochlorothiazide)
Aldoril (Methyldopa/hydrochlorothiazide)

AHA - 2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults
Uptodate - Choice of drug therapy in primary (essential) hypertension
Uptodate - Thiazides versus loop diuretics in the treatment of hypertension
Uptodate - Use of thiazide diuretics in patients with primary (essential) hypertension
Uptodate - Time course of loop and thiazide diuretic-induced electrolyte complications
Pubmed - Mechanisms for blood pressure lowering and metabolic effects of thiazide and thiazide-like diuretics
AAFP - Thiazide Diuretics Remain First-Line Treatment for Hypertension
Medscape: Diuretic-Related Side Effects: Development and Treatment

Done by:
Dr.Samaher AlSaad - KSUMC Family Medicine Resident
Dr.Razan AlHadlaq - KSMC Family Medicine Resident
Supervised by: Dr.Abdulaziz AlOdhayani - Assistant Professor, Consultant Family Medicine at KSUMC

Hypertension MCQs

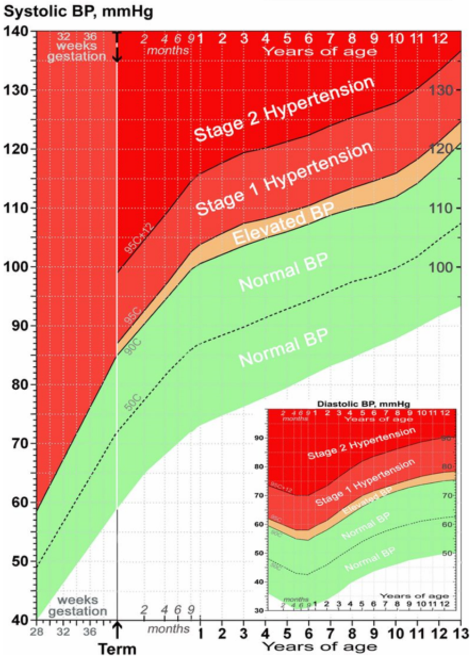
Pretest 4th Edition

Your last patient of the day is a 15-year-old male child who needs his sports preparticipation physical completed so he can participate in football practice tomorrow. Past medical history includes allergic rhinitis and obesity. Upon review of his chart, you notice that he was seen a month ago by one of your partners and his blood pressure was elevated at the time. The physician recommended an increase in physical activity, healthy dietary changes, and a follow-up in 1 month. The boy states he signed up for football so he could be more active. Today, two blood pressure readings taken 15 minutes apart fall just below the 90th percentile category for his age and height. How would you categorize his blood pressure?

A. This is a normal blood pressure for his age and height.
B. This is prehypertension.
C. This is stage 1 hypertension.
D. This is stage 2 hypertension.
E. This is hypotension.

Answer: A.

Hypertension in children is often overlooked. It is more often due to secondary causes than in adults and can lead to hypertension in adulthood. Normal pediatric blood pressure values in children increase with body size, age, and height. Abnormal blood pressure values are defined by the National High Blood Pressure Education Program (NHBPEP) and are based on tables produced by the National Institutes of Health. Normal blood pressure is defined as systolic or diastolic blood pressure that is less than 90th percentile based on age and height. Prehypertension is blood pressure in the 90th to less than 95th percentile (or ≥ 120/80 mm Hg). Stage 1 hypertension is blood pressure between the 95th to less than 99th percentile plus 5 mm Hg, and stage 2 hypertension is blood pressure more than 99th percentile plus 5 mm Hg.



You are treating a 45-year-old man for hypertension. Since beginning therapy, he complains of urinary leakage and urgency. Which antihypertensive class is most likely to cause this?

A. Thiazide diuretics.
B. ACE inhibitors.
C. β-Blockers.
D. Calcium channel blockers.
E. α-Blockers.

Answer: C.

Pharmaceuticals are a common cause of incontinence. There are many neural receptors involved in urination and, therefore, many medications that are used to treat other medical issues can often cause problems. Antihypertensives are especially problematic. α-Blockers cause urethral sphincter relaxation and can cause urinary leakage, but not urgency. Calcium channel blockers can cause urinary retention. Diuretics can cause increased frequency and urgency, but usually not leakage. β-Blockers inhibit bladder relaxation and therefore can cause both urinary leakage and urgency.

You are in the ER caring for a 47-year-old man who was brought in by his wife. She states that he complained of a headache and started to become irritable. She then noticed that he started acting confused. His past medical history is unremarkable, without evidence of drug or alcohol use. On examination, you find his blood pressure to be 210/130 mm Hg, his pulse to be 97 beats/min, and his respirations to be 20 breaths/min. His temperature is 98.4°F. Strength, sensation, and gait are normal. He has no tremor. Which of the following would you expect to find on ophthalmologic examination?

A. Pinpoint pupils.
B. Dilated pupils.
C. Papilledema.
D. Sixth cranial nerve palsy.
E. Anisocoria of 1 mm.

Answer: C.

The patient described has a hypertensive encephalopathy. With his severe hypertension, a stroke may be considered, but unlikely without focal neurologic deficits. Sixth nerve palsy may be seen in a stroke. Pinpoint pupils would be more consistent with narcotic excess, unlikely given his vital signs and history. Dilated pupils suggests sympathetic outflow, and may be consistent with delirium tremens, but the history and physical is not consistent with this. Papilledema is seen with hypertensive encephalopathy. Anisocoria of 1 mm is a nonspecific finding that can be seen in normal individuals.

You are evaluating a 35-year-old man whose systolic blood pressure (SBP) has been between 140 and 160 mm Hg on three separate occasions in the office, despite lifestyle modifications. He asks you why it is important to follow-up on these findings. According to observational studies, which of the following is true?

A. The risk of CVD increases in a linear fashion between SBP between 140 and 180 mm Hg.
B. An SBP 20 mm Hg higher than normal is associated with a doubling in the risk of death from stroke.
C. An increased risk of CVD is associated with higher SBP at all ages.
D. The relative risk of CVD is lower for this patient than it would be for an elderly person with the same blood pressure.
E. This patient is at greater risk for MI and stroke, but not for heart failure or peripheral artery disease (PAD).

Answer: B.

Many observational studies have demonstrated graded associations between higher SBP and increased CVD risk. Risks for CVD increase in a log-linear fashion with SBP levels less than 115 mm Hg to more than 180 mm Hg and from diastolic blood pressure (DBP) levels less than 75 mm Hg to more than 105 mm Hg. In addition, blood pressure 20 mm Hg higher than normal is associated with a doubling in the risk of death from stroke, heart disease, or other vascular disease. Studies have also shown that higher SBP is associated with increased risk of angina, MI, HF, stroke, PAD, and abdominal aortic aneurysm. The increased risk of CVD associated with higher SBP has been reported across a broad age spectrum, from 30 years to more than 80 years of age. Interestingly, the relative risk of incident CVD associated with higher SBP is smaller at older ages.

For questions 1 to 5, assume you and your staff have appropriately measured blood pressures of several people in your office. Which of the following categories would these blood pressures fall into (According to ACC/AHA guidline) ?

1. A 24-year-old woman with these three consecutive independent readings: 118/78, 126/84, and 112/68?

A. Normal blood pressure.
B. Elevated blood pressure.
C. Stage I hypertension.
D. Stage II hypertension.
E. Hypertensive crisis.

Answer: A.

Normal BP <120 systolic and <80 diastolic

2. A 36-year-old African-American man with these three consecutive independent readings: 124/86, 130/90, and 122/84?

A. Normal blood pressure.
B. Elevated blood pressure.
C. Stage I hypertension.
D. Stage II hypertension.
E. Hypertensive crisis.

Answer: C.
Stage I: 130-139 systolic OR 80-89 diastolic

3. A 52-year-old obese woman with these three consecutive independent readings: 132/92, 129/90, and 134/94?

   A. Normal blood pressure.
   B. Elevated blood pressure.
   C. Stage I hypertension.
   D. Stage II hypertension.
   E. Hypertensive crisis.

Answer: D.
Stage II: > 140 OR > 90

4. A 43-year-old man with these three consecutive independent readings: 122/82, 124/86, and 118/84?

   A. Normal blood pressure.
   B. Elevated blood pressure.
   C. Stage I hypertension.
   D. Stage II hypertension.
   E. Hypertensive crisis.

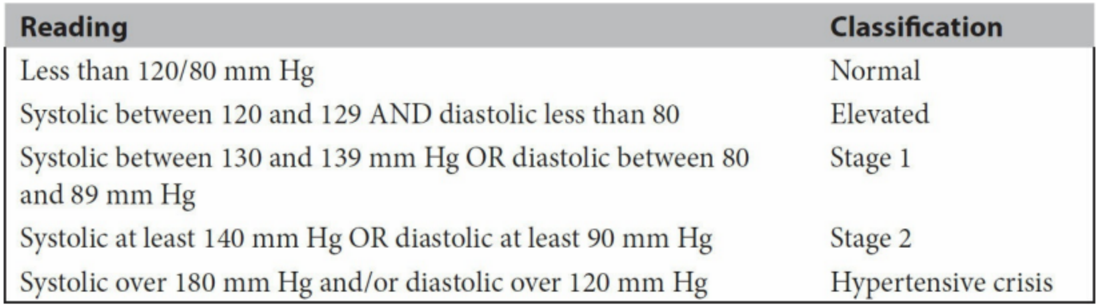
Answer: C.
Stage I: 130-139 systolic OR 80-89 diastolic
s

5. A 33-year-old man with a family history of hypertension with these three consecutive independent readings: 116/72, 122/68, and 128/78?

   A. Normal blood pressure.
   B. Elevated blood pressure.
   C. Stage I hypertension.
   D. Stage II hypertension.
   E. Hypertensive crisis.

Answer: B.
Categorizing blood pressure is important to help determine treatment options. The stage is determined after appropriately taking two or more blood pressure readings on two or more occasions and averaging those readings. A table outlining the classifications is below. If the SBP and DBP are in two separate categories, the blood pressure should be designated in the higher category. The newer categorization eliminates the category

of “prehypertension.”



Reading	Classification
Less than 120/80 mm Hg	Normal
Systolic between 120 and 129 AND diastolic less than 80	Elevated
Systolic between 130 and 139 mm Hg OR diastolic between 80 and 89 mm Hg	Stage 1
Systolic at least 140 mm Hg OR diastolic at least 90 mm Hg	Stage 2
Systolic over 180 mm Hg and/or diastolic over 120 mm Hg	Hypertensive crisis

You have diagnosed a 42-year-old patient with hypertension. He is 5 ft 9 in tall, weighs 230 lb, and admits to poor eating habits, drinking four alcoholic beverages daily, and no regular exercise. Which of the following lifestyle modifications, if instituted, will result in the largest SBP reduction?

A. Moderate alcohol consumption to no more than two drinks daily.
B. Engage in physical activity for 30 minutes per day, most days of the week.
C. Reduce dietary sodium intake to no more than 100 mEq/L per day.
D. Adopt a Dietary Approaches to Stop Hypertension (DASH) eating plan (a diet rich in fruits, vegetables, and low-fat dairy products with a reduced saturated and total fat content).
E. Lose 8 to 10 lbs.

Answer: D.

Lifestyle modifications can help to manage hypertension. Weight reduction is beneficial, and SBP can fall up to 4 to 5 mm Hg for each 4 kg of weight lost. A DASH diet can lower blood pressure between 8 and 14 mm Hg. Dietary sodium reduction, increased exercise, and moderation of alcohol can be expected to lower SBP between 3 and 6 mm Hg.

You have seen a 36-year-old African-American man with elevated blood pressure. On one occasion, his blood pressure was 128/84 mm Hg, and on a second occasion, his blood pressure was 138/88 mm Hg. You have encouraged lifestyle modifications including weight loss using exercise and dietary changes. Despite some modest weight loss, at his current visit, his blood pressure is 128/89 mm Hg. Which of the following is the best treatment strategy at this point?

A. Use a thiazide diuretic.
B. Use an ACE-inhibitor.
C. Use an angiotensin receptor blocker.
D. Use a β-blocker.
E. Use a two-drug combination of medications.

Answer: A.

The patient in this question has stage I hypertension (SBP between 130 and 139 mm Hg, or diastolic blood pressure between 80 and 89 mm Hg). Since lifestyle modifications have not helped, the next step is to institute drug therapy. The most effective first-line treatment for preventing the occurrence of CVD is either an ACE-inhibitor, an ARB, a calcium channel blocker, or a thiazide diuretic. In the African-American hypertensive population, a calcium channel blocker or a thiazide diuretic is recommended.

You have just diagnosed a 35-year-old man with hypertension. He is otherwise healthy and has no complaints. Which of the following is indicated in the initial evaluation?

A. Uric acid level.
B. Resting electrocardiogram.
C. Stress test.
D. Echocardiogram.
E. Renal ultrasound.

Answer: B.
Baseline laboratory screening is important to assess for end-organ damage and identify patients at high risk for cardiovascular complications. The routine tests for a newly diagnosed hypertensive patient include hemoglobin and hematocrit, sodium, potassium, creatinine, fasting glucose, calcium, a fasting lipid profile, urinalysis, a TSH, and a resting electrocardiogram. An echocardiogram and a uric acid level are optional. Other tests are not indicated unless physical examination or history makes them likely to be positive.

You are treating a 61-year-old man for hypertension. He is not responding well to combination therapy with a thiazide diuretic and a β-blocker. On physical examination, you note an abdominal bruit. Which of the following tests is most likely to help you evaluate him further?

A. CXR.
B. MRI or magnetic resonance arteriography (MRA).
C. Urinary metanephrines and vanillylmandelic acid levels.
D. Aortic CT scan.
E. Echocardiogram.

Answer: B.
The prevalence of renovascular disease as the cause in a person with hypertension alone is around 5%. The patient described in the question has physical examination findings consistent with renal artery stenosis. Imaging options include MRI/MRA, CT scan, and ultrasound. The preferred method depends on capabilities of the institution. Urinary metanephrines and vanillylmandelic acid levels would help rule out pheochromocytoma. A CXR would be helpful if coarctation of the aorta were suspected. An aortic CT would help to or quantify an aortic aneurysm, and an echocardiogram would help to identify left ventricular hypertrophy or systolic dysfunction.

A 48-year-old male patient suffered from an ischemic stroke. Prior to his stroke, he was untreated for hypertension. After full recovery, he follows up at your office. On examination, his blood pressure is 132/82 mm Hg. Which of the following is true?

A. An ACE-inhibitor should be used to help him achieve a blood pressure less than 130/80.
B. Hydrochlorothiazide should be used to help him achieve a blood pressure less than 130/80.
C. A β-blocker should be used to help him achieve a blood pressure less than 130/80.
D. A β-blocker and hydrochlorothiazide should be used to help him achieve a blood pressure less than 130/80.
E. The usefulness of initiating antihypertensive treatment in this patient is not well established.

Answer: E.
2017 ACC/AHA guidelines indicate that for secondary stroke prevention, the usefulness of initiating antihypertensive treatment is not well established for blood pressures less than 140/90. For previously treated adults, a goal of 130/80 is reasonable.

A 55-year-old man comes to your office after not being seen by a physician in more than 10 years. He is found to be hypertensive, and his creatinine is found to be 2.3 mg/dL (high). Which medication is most likely to control his blood pressure and decrease the likelihood of progression of his renal disease?

A. A thiazide diuretic.
B. An ACE-inhibitor.
C. A calcium channel blocker.
D. A β-blocker.
E. An aldosterone antagonist.

Answer: B.
Several clinical trials have documented the benefit of ACE-inhibitors in patients with hypertension and CKD. ARBs are also beneficial. His blood pressure goal should be less than 130/80.

You diagnosed a 47-year-old woman with hypertension around 6 months ago. Her home blood pressure readings are not at goal, and her blood pressure readings in the office are also not at goal. Of the following, which is the most likely cause of her uncontrolled hypertension?

A. Treatment nonadherence.
B. Undiagnosed renal artery stenosis.
C. Primary aldosteronism.
D. Undiagnosed thyroid disorder.
E. Concomitant use of stimulant medications.

Answer: A.
The three most common causes of uncontrolled hypertension in patients who are diagnosed with the disease

are patient nonadherence, inadequate therapy, and inappropriate therapy. Other secondary causes of hypertension are possible, but less likely than nonadherence, and while use of some medications may make blood pressure control difficult, nonadherence is more common.

You are monitoring the blood pressure in a 53-year-old patient with stage II hypertension. The patient has no signs or symptoms indicative of secondary hypertension. The patient is not at goal despite maximized dosage of a generic ACE-inhibitor and thiazide diuretic. Which of the following is the appropriate next step?

A. Diagnose the patient with resistant hypertension and refer to specialist.
B. Add a third agent from a different class to the regimen.
C. Change the ACE-inhibitor to an ARB.
D. Change the ACE-inhibitor to a different ACE-inhibitor.
E. Change the thiazide diuretic to a loop diuretic.

Answer: B.
Most patients with hypertension do not reach their blood pressure goal with a single medication, and most need a second from a different class. If a patient is not at goal with two medications at maximized dosage, the addition of a third agent from another class is the best next step. Changing to a different brand within the same class may help in some cases, but using a third class is likely to be more effective. Changing to a different class (rather than adding a medication from a third class) is not likely to help the patient reach his/her blood pressure goal.

ABFM 2022

While reviewing laboratory studies for a patient who was recently started on antihypertensive medication, you note new hyperkalemia. Which one of the following medications is most likely to cause this finding?

A. Amlodipine (Norvasc).
B. Chlorthalidone.
C. Hydrochlorothiazide.
D. Metoprolol.
E. Olmesartan (Benicar).

Answer: E.
Hyperkalemia is a known side effect of ACE inhibitors and angiotensin receptor blockers such as olmesartan. The risk of hyperkalemia is increased with chronic kidney disease, diabetes mellitus, moderately severe to severe heart failure, NSAID use, and older adults. Chlorthalidone and hydrochlorothiazide can cause hypokalemia, while amlodipine and metoprolol have no significant effect on potassium levels.

A 45-year-old male sees you for a routine visit. His medical history includes hypertension treated with hydrochlorothiazide, amlodipine (Norvasc), and losartan (Cozaar). He also has type 2 diabetes treated with metformin and empagliflozin (Jardiance). Laboratory findings are significant for an LDL-cholesterol level of 167 mg/dL and you prescribe simvastatin (Zocor), 80 mg daily. At a follow-up visit 3 months later he tells you that he stopped taking the simvastatin after a week due to muscle pain and weakness. Which one of the following medications in this patient's current regimen most likely contributed to his risk for developing statin-induced myopathy?

A. Amlodipine.
B. Empagliflozin.
C. Hydrochlorothiazide.
D. Losartan.
E. Metformin.

Answer: A.

Most statins are metabolized in the liver by cytochrome P450 3A4 (CYP3A4) enzymes. In patients on statin therapy, concurrent use of other medications that are also metabolized by this system, including amiodarone, calcium channel blockers such as amlodipine, certain anti-HIV medications, and certain antifungal medications, can increase the risk of complications such as statin-induced myopathy. In this patient, only simvastatin and amlodipine are metabolized by CYP3A4. Losartan is metabolized by cytochrome P450 enzymes other than 3A4 (2C9), and this patient's other medications are metabolized by different mechanisms (empagliflozin) or not significantly metabolized (hydrochlorothiazide and metformin).

Which one of the following regimens is recommended for the treatment of hypertension in a patient with stage 3 chronic kidney disease and proteinuria?

A. A loop diuretic and a β-blocker.
B. An ACE inhibitor and an angiotensin receptor blocker.
C. An ACE inhibitor and a thiazide diuretic.
D. A calcium channel blocker and a thiazide diuretic.
E. A potassium-sparing diuretic and a thiazide diuretic.

Answer: C.

Based on a reduction in all-cause mortality, JNC 8 advises more intensive blood pressure control in patients with chronic kidney disease (CKD) and proteinuria. This is most often achieved with combination therapy, with either an ACE inhibitor or an angiotensin receptor blocker (ARB), plus either a thiazide diuretic or a calcium channel blocker. ACE inhibitors and ARBs both slow the progression of CKD to end-stage renal disease and reduce morbidity and mortality in patients with CKD (SOR A). However, combining an ACE inhibitor and an ARB actually increases the risk of end-stage renal disease, so these drugs should not be used simultaneously. The other combinations listed may be effective in improving blood pressure control, but in patients with CKD and proteinuria the combination of an ACE inhibitor or an ARB with a diuretic or calcium channel blocker is most effective for lowering morbidity and mortality.

A 30-year-old gravida 3 para 2 sees you for prenatal care at 13 weeks gestation. During her previous pregnancies she became hypertensive and had bilateral leg edema and proteinuria. These conditions resolved after delivery. Her only current medication is a prenatal vitamin. In order to prevent this condition, which one of the following should be started today?

A. No new medications.
B. Aspirin.
C. Fish oil.
D. Magnesium.
E. Vitamin C.

Answer: B.

Preeclampsia is diagnosed when the blood pressure is 140/90 mm Hg on two separate occasions after 20 weeks gestation, accompanied by proteinuria (>300 mg protein in a 24-hour urine collection or 2+ protein on a dipstick). If there is no protein in the urine, new-onset hypertension and the presence of any of the following would meet the criteria for preeclampsia: thrombocytopenia, renal insufficiency, impaired liver function, pulmonary edema, or cerebral or visual symptoms. This patient had preeclampsia during her previous pregnancies, which puts her at high risk for preeclampsia during her current pregnancy. Aspirin, 81 mg daily, is recommended for high-risk pregnant patients to prevent preeclampsia. Prophylaxis should begin after 12 weeks gestation and continue until delivery. Fish oil, magnesium, and vitamin C are not beneficial in the prevention of preeclampsia.

A 55-year-old female comes to your clinic for follow-up of her poorly controlled hypertension. Her medical history also includes type 2 diabetes and worsening obstructive sleep apnea (OSA). Her BMI is 52 kg/m2. Her heart rate is 62 beats/min and regular. Her blood pressure in the clinic today is 160/96 mm Hg, and she reports similar average readings at home. She is asymptomatic and says she has been following lifestyle modifications including a low-salt diet. She also reports that she has been adherent with her current antihypertensive regimen, which includes the following:
Amlodipine (Norvasc), 10 mg daily.
Carvedilol (Coreg), 25 mg twice daily.
Chlorthalidone, 25 mg daily.
Losartan (Cozaar), 100 mg daily.
Which one of the following antihypertensive medication changes would benefit both her blood pressure and her OSA?

A. Switching chlorthalidone to hydrochlorothiazide, 25 mg daily.
B. Switching carvedilol to an equivalent dosage of metoprolol tartrate (Lopressor).
C. Switching losartan to an equivalent dosage of an ACE inhibitor.
D. Increasing the current dosage of losartan to 100 mg twice daily.
E. Adding a low dosage of spironolactone (Aldactone) to her current regimen.

Answer: E.

Secondary forms of hypertension are common in patients with resistant hypertension, and sleep-disordered breathing is an important cause of resistant hypertension. Multiple studies have shown that excess aldosterone plays a key role in the association between the two. As rates of obesity and obstructive sleep apnea (OSA) have increased, the prevalence of resistant hypertension has also increased. It is estimated that almost 17%–22% of patients with resistant hypertension may have undiagnosed primary hyperaldosteronism. The increased expression of mineralocorticoid receptors in patients with a high BMI contributes to hyperaldosteronism, and blockage of these receptors with medications such as spironolactone has been shown to provide benefit in reducing the severity of OSA as well as hypertension in these patients. Substituting one thiazide for another does not have a beneficial effect in patients with resistant hypertension. Switching -blockers in this case is unlikely to have a significant impact on blood pressure and might have an adverse impact, as carvedilol has been shown to have more favorable effects on glycemic control and other components of metabolic syndrome relative to metoprolol tartrate in patients with diabetes. Increasing the angiotensin receptor blocker dosage or substituting an ACE inhibitor will not be as beneficial in controlling this patient’s blood pressure.

A 48-year-old male presents for follow-up of his hypertension. His medications include generic amlodipine, 10 mg; lisinopril (Zestril), 20 mg; and hydrochlorothiazide, 25 mg. His blood pressure today is 156/92 mm Hg. He says that he forgot to take his medications this morning, and reports that he often forgets to take them. He does not have any specific concerns about side effects. Which one of the following would be most likely to increase this patient’s medication adherence?

A. Taking his medications before bed.
B. Changing generic amlodipine to branded Norvasc.
C. Changing generic amlodipine to generic nifedipine.
D. Replacing lisinopril and hydrochlorothiazide with combination lisinopril/hydrochlorothiazide (Zestoretic).
E. Adding metoprolol.

Answer: D.
Simplifying medication regimens, including using combination medications to decrease the number of pills a patient must take, has been shown to improve medication adherence in clinical trials (SOR B). Taking antihypertensive medications before bed has not been shown to improve adherence. Prescribing brand name medications increases costs, which may decrease adherence. Unless specific side effects are a concern, changing medications or adding another agent would not be likely to improve adherence.

A 50-year-old male comes to your office for a health maintenance visit. He does not have any symptoms today. You last saw him 4 years ago and at that time his BMI was 24 kg/m2, his blood pressure was 124/70 mm Hg, and a lipid panel was normal. Today he tells you that he gained some weight and started smoking due to a stressful job. He is concerned about his risk for cardiovascular disease. Which one of the following would be the most appropriate screening test for this patient at this time?

A. Hypertension screening.
B. An ankle-brachial index.
C. A coronary artery calcium score.
D. An EKG.
E. Abdominal duplex ultrasonography.

Answer: A.

The U.S. Preventive Services Task Force (USPSTF) recommends screening for hypertension with office blood pressure measurement in adults ≥18 years of age (A recommendation). Adults ≥40 years of age and those ≥18 years of age with risk factors should receive annual hypertension screening. Less frequent screening is recommended for adults 18–39 years of age without risk factors. The USPSTF found insufficient evidence to recommend an ankle-brachial index (I recommendation) or a coronary artery calcium score (I recommendation) for cardiovascular screening, even in patients with traditional risk factors such as male sex, older age, current smoking, and overweight/obesity status. Cardiovascular screening with an EKG is not recommended (D recommendation). The USPSTF did not find adequate evidence to suggest that adding a resting or exercise EKG helped guide treatment decisions to reduce cardiovascular events in asymptomatic adults. It identified some evidence that small to moderate harms may exist, such as unnecessary invasive procedures. The USPSTF recommends abdominal duplex ultrasonography (B recommendation) for men 65–75 years of age who have ever smoked, which is usually defined as 100 cigarettes or more in a lifetime. The only appropriate screening test for the patient in this scenario is blood pressure measurement.

A 56-year-old male was recently diagnosed with hypertension and started on lisinopril (Zestril). At a follow-up visit his blood pressure remains elevated and his serum creatinine level has increased from 0.9 mg/dL to 1.8 mg/dL (N 0.7–1.3). He has no other known medical issues and has a normal BMI. Which one of the following should be ordered to confirm the most likely cause of his hypertension?

A. Renin and aldosterone levels.
B. A TSH level.
C. 24-hour urinary free cortisol.
D. 24-hour urinary fractionated metanephrines and normetanephrines.
E. CT angiography of the abdomen and pelvis.

Answer: E.

Resistant hypertension occurs in 5%–10% of adults with hypertension. In this patient, renal artery stenosis is suggested by the increase in creatinine of more than 50% after starting an ACE inhibitor. CT angiography, renal artery duplex ultrasonography, and MR angiography are appropriate diagnostic tests for renal artery stenosis. Other causes of resistant hypertension include hyperaldosteronism (diagnosed with renin and aldosterone levels), thyroid disorders (diagnosed with TSH levels), Cushing syndrome (diagnosed with 24-hour urinary free cortisol), and pheochromocytoma (diagnosed with 24-hour urinary fractionated metanephrines and normetanephrines).

ABFM 2021

Which one of the following antihypertensive medications is LEAST likely to exacerbate erectile dysfunction?

A. Clonidine (Catapres).
B. Doxazosin (Cardura).
C. Hydrochlorothiazide.

D. Losartan (Cozaar).
E. Metoprolol.

Answer: D.
Angiotensin receptor blockers (ARBs) such as losartan are least likely to cause or exacerbate erectile dysfunction. ARBs may have a favorable effect on erectile dysfunction by inhibiting vasoconstriction activity of angiotensin. Clonidine, α-blockers, hydrochlorothiazide, and β-blockers are more likely to negatively affect erectile function.

A 55-year-old female with diabetes mellitus and hypertension sees you because of a 3-month history of a persistent nonproductive cough. Two weeks after the cough began she presented to a local urgent care center with additional symptoms of sinus pressure, rhinorrhea, and subjective wheezing. A lung examination and chest radiograph performed at that visit were unremarkable. She was diagnosed with acute bronchitis and prescribed benzonatate (Tessalon). Since then, her sinus-related symptoms have abated, although her cough has not improved. Her current medications include metformin (Glucophage), lisinopril (Prinivil, Zestril), and hydrochlorothiazide, all of which were initiated 6 months ago. She has no known allergies and has never smoked. A physical examination today is unremarkable. Which one of the following is the most likely cause of her cough?

A. Chronic lung disease.
B. Infection.
C. Malignancy.
D. A medication side effect.
E. A psychogenic habit.

Answer: D.
Of the choices listed, an adverse effect of medication, specifically lisinopril, is the most likely cause of this patient’s persistent cough. ACE inhibitors are among the most common causes of chronic cough, with an estimated incidence of 5%–35% of patients. The onset of an ACE inhibitor–induced cough may occur within hours to months after the first dose. A proper evaluation of patients presenting with a chronic cough, which is defined in adults as a persistent cough lasting >8 weeks, begins with a careful history, with attention to smoking status, environmental exposures, and medication use. Identifying ACE inhibitor use is particularly important for a patient with hypertension and diabetes mellitus presenting with a persistent dry cough. If ACE inhibitor use is identified, consideration should be given to a trial of medication elimination, which is the only way to determine if the medication is the cause. If so, the cough should resolve within days, although resolution may take up to 3 months to occur. Chronic lung disease, although a common cause of cough, would be less likely in a patient of this age with symptoms only for the past several months, particularly without a smoking history or associated dyspnea. Similarly, the absence of a tobacco history or alarm symptoms such as unintended weight loss or hemoptysis, coupled with a normal chest radiograph, makes malignancy less likely. Infection is also less likely, given the absence of constitutional symptoms coupled with a normal physical examination and recent normal chest imaging. Psychogenic cough is a rare cause of cough in adults and children, and would be much less likely in this situation.

A 52-year-old male with known hypertension and hyperlipidemia comes to your office for a follow-up visit. His last visit was more than a year ago. He was unemployed for several months and lost his health insurance. Two months ago he ran out of his medications, which included amlodipine (Norvasc), hydrochlorothiazide, and atorvastatin (Lipitor). He says that he feels fine and has not had any chest pain, changes in vision, difficulty breathing, or lower extremity edema. He is a nonsmoker, and he does not drink alcohol or use illicit drugs. He drinks one cup of coffee daily. He does not take any over-the-counter medications. On examination his vital signs include a blood pressure of 190/120 mm Hg, a pulse rate of 80 beats/min, and an oxygen saturation of 96% on room air. You recheck his blood pressure after he sits quietly for 30 minutes and there is no significant change. A physical examination, including fundoscopy, is normal. Which one of the following would be the most appropriate next step?

A. Administer clonidine (Catapres), 0.1 mg orally, and recheck his blood pressure in 30 minutes.
B. Administer nifedipine (Procardia), 60 mg orally, and recheck his blood pressure in 30 minutes.
C. Order laboratory studies to look for end-organ damage, and tell him to restart his previous medications.
D. Admit him to the intensive-care unit for intravenous treatment to lower his blood pressure.
E. Call 911 and have him transported to the emergency department.

Answer: C.

A hypertensive urgency is defined as a confirmed blood pressure >180/110–120 mm Hg without symptoms or signs of end-organ damage. Patients without symptoms in the setting of severe hypertension rarely have end-organ damage. The most common cause of hypertensive urgency in patients with known hypertension is nonadherence to the use of antihypertensive medications. When a significantly elevated blood pressure is measured, it should be repeated after 20–30 minutes of quiet rest. Blood pressures should be taken in both arms and a thigh to confirm elevation. One-third of patients with an initially elevated blood pressure will have significantly lower pressure after rest. Patients who are asymptomatic with persistently elevated blood pressures can be safely treated with oral antihypertensives with close follow-up (SOR C). There is no standard workup for patients with hypertensive urgencies, but common practice includes obtaining a basic metabolic panel, CBC, urinalysis, EKG, and troponin to rule out end-organ damage. Oral medications to lower blood pressure in a patient with a hypertensive urgency are not indicated unless the patient is symptomatic. Symptoms such as headache or epistaxis warrant acute lowering of blood pressure. Preferred medications include clonidine, labetalol, and captopril, among others. Oral nifedipine is not recommended due to unpredictable blood pressure responses. Patients with physical or laboratory evidence of end-organ damage should be admitted to the intensive-care unit for intravenous treatment of blood pressure. Without symptoms of end-organ damage there is no need to transport patients to the emergency department, as hypertensive urgencies can be managed with outpatient care.

A 70-year-old female with a history of coronary artery disease, a femorofemoral bypass 3 years ago, and hypertension sees you for a follow-up visit. She has intermittent right arm pain that is worse with exercise. The pain increases with all arm exercises and improves with rest. The patient’s blood pressure is 140/70 mm Hg in the left arm and 120/64 mm Hg in the right arm. Which one of the following would be the most appropriate next step?

A. Radiographs of the right shoulder.
B. Arterial duplex ultrasonography of the upper extremities.
C. MR angiography.

D. No imaging, and referral to physical therapy.

Answer: B.

This patient has peripheral artery disease (PAD) of the right arm. PAD of the upper extremities is characterized by pain with exertion and can cause gangrene and ulceration. It is more common in patients who have had lower extremity occlusive disease. A blood pressure differential of 15 mm Hg between arms suggests stenosis and warrants further testing. Initial testing in symptomatic patients includes arterial duplex ultrasonography of the upper extremities. CT angiography and MR angiography may be appropriate to clarify the diagnosis or plan intervention. Neither radiography nor physical therapy would be appropriate.

A 55-year-old male sees you because of a second flare of gout. He has also had an elevated blood pressure at the last few visits to your clinic and is hypertensive again today. In addition to treating his gout flare, which one of the following would be the most appropriate agent to treat his hypertension in light of his presenting problem?

A. Atenolol (Tenormin).
B. Hydralazine.
C. Hydrochlorothiazide.
D. Lisinopril (Prinivil, Zestril).
E. Losartan (Cozaar).

Answer: E.

The 2020 American College of Rheumatology guideline for the management of gout generated numerous recommendations, including the management of concurrent medications in patients with gout. In such patients, losartan is the preferred antihypertensive agent when possible (SOR C). Hydrochlorothiazide should typically be changed to another agent, such as losartan, when feasible in patients with gout (SOR C). Both hydrochlorothiazide and losartan are known to have effects on the serum urate concentrations, with hydrochlorothiazide causing an increase and losartan causing a decrease. The American College of Rheumatology guideline does not recommend for or against the use of atenolol, hydralazine, and lisinopril as antihypertensive treatment in patients with gout.

A 23-year-old primigravida comes to your office for her initial obstetric visit. She is at 13 weeks gestation based on the dates of her last menstrual period. She is a nonsmoker and does not drink alcohol or use illicit substances. Her vital signs are remarkable for a blood pressure of 142/92 mm Hg and a BMI of 32 kg/m2. She says that she has been diagnosed with hypertension in the past but has not taken any medications for it. In addition to a prenatal vitamin, which one of the following would you recommend for her?

A. No additional medications.
B. Aspirin.
C. Ferrous sulfate.
D. Folic acid.
E. Labetalol (Trandate).

Answer: B.

The U.S. Preventive Services Task Force (USPSTF) recommends prescribing low-dose aspirin after 12 weeks gestation for asymptomatic women at high risk for preeclampsia. Women at high risk include those with a history of preeclampsia, chronic hypertension, multiple pregnancy, type 1 or 2 diabetes, renal disease, autoimmune disease, or any combination of these. Many women become iron deficient in pregnancy but not all will require additional iron supplementation beyond what is available in the prenatal vitamin. The USPSTF found insufficient evidence to recommend for or against routine iron supplementation for pregnant women. Additional folic acid is recommended for women with increased risk for neural tube defects (NTDs), and while obesity increases the risk for NTD it is not an indication alone for a higher dosage of folic acid than the levels found in prenatal vitamins. In pregnant patients with chronic hypertension, treatment with antihypertensive medications is recommended only when the blood pressure is >150/100 mm Hg, because aggressive blood pressure lowering may result in placental hypoperfusion.

A 63-year-old female sees you for follow-up after an emergency department (ED) visit. CT performed in the ED confirmed diverticulitis and she was treated as an outpatient. The discharge paperwork and radiology reports also indicate that she has a left superior adrenal nodule measuring 1.2 cm. Which one of the following concurrent conditions should prompt a hormonal workup?

A. Hyperlipidemia.
B. Hypertension.
C. Renal cell carcinoma.
D. Rheumatoid arthritis.
E. Type 2 diabetes.

Answer: B.

Incidentally found adrenal masses are very common, occurring in 3%–7% of adults. The majority of these masses are benign nonfunctioning adenomas, although some are primary and functioning adrenal tumors such as pheochromocytoma and adenomas that secrete aldosterone and cortisol. Metastatic lesions are associated with bronchogenic carcinomas, renal cell carcinomas, and melanomas. Most masses measuring 1–4 cm are benign and can be monitored for growth changes with radiographs. Hormonal evaluation should be considered in patients who have a history or physical findings that would suggest a hyperfunctioning adrenal adenoma, such as hypertension. A concurrent condition of renal cell carcinoma would suggest a metastatic lesion rather than a hyperfunctioning lesion. Hyperlipidemia, rheumatoid arthritis, and type 2 diabetes are not associated with excessive adrenal function.

You admit a 68-year-old female with an acute stroke to the hospital. She has no other acute cardiovascular conditions. CT rules out a hemorrhagic event. You have determined that the patient is not a candidate for reperfusion therapy with alteplase or thrombectomy. You advise the nursing staff that you will be initiating antihypertensive therapy if the patient's blood pressure rises above a threshold of?

A. 120/80 mm Hg.

B. 140/90 mm Hg.
C. 160/100 mm Hg.
D. 180/110 mm Hg.
E. 220/120 mm Hg.

Answer: E.

Because patients with an acute ischemic stroke may require the increased perfusion pressure to limit ischemia, antihypertensive therapy should not be given during the first 48–72 hours as long as they are not candidates for, or recipients of, reperfusion therapy with alteplase or thrombectomy; do not have a comorbid condition requiring acute blood pressure lowering; and do not have a blood pressure >220/120 mm Hg.

A 62-year-old male with hypertension and metabolic syndrome sees you for follow-up. A fasting triglyceride level is 300 mg/dL. You address lifestyle and other potential causes of his elevated triglycerides, including his current medications. If included in his current regimen, which one of the following hypertension medications would be most likely to contribute to his hypertriglyceridemia?

A. Amlodipine (Norvasc).
B. Diltiazem (Cardizem).
C. Lisinopril (Prinivil, Zestril).
D. Metoprolol.

Answer: D.

Several medications can be secondary causes of hypertriglyceridemia, including b blockers, with the exception of carvedilol. Others include oral estrogens, glucocorticoids, bile acid sequestrants, protease inhibitors, retinoic acid, anabolic steroids, sirolimus, raloxifene, tamoxifen, and thiazides. Calcium channel blockers, ACE inhibitors, and angiotensin receptor blockers are not associated with hypertriglyceridemia.

A 50-year-old female sees you for further evaluation after she had elevated blood pressure on two consecutive visits to an urgent care clinic for minor illnesses. She has no history of chest pain, shortness of breath, headache, or changes in vision. She has smoked half a pack of cigarettes daily since the age of 16 and has an allergy to iodine. There is no other significant medical history. On examination the patient has a blood pressure of 155/92 mm Hg and a heart rate of 80 beats/min. The cardiovascular and pulmonary examinations are otherwise normal. A basic metabolic panel and a TSH level are normal. In addition to lifestyle changes, which one of the following would be most appropriate as initial pharmacologic therapy for management of this patient's hypertension?

A. Carvedilol.
B. Furosemide (Lasix).
C. Hydralazine.
D. Hydrochlorothiazide.
E. Spironolactone (Aldactone).

Answer: D.
According to the JNC 8 panel, the goal for treatment of hypertension in a patient <60 years of age should be a blood pressure <140/90 mm Hg. This patient has had multiple blood pressure readings higher than the threshold, which warrants treatment. Appropriate initial treatment of hypertension should include a thiazide-type diuretic, calcium channel blocker, ACE inhibitor, or angiotensin receptor blocker. A β-blocker such as carvedilol, a diuretic such as furosemide, a vasodilator such as hydralazine, or an aldosterone receptor antagonist such as spironolactone would not be an appropriate first-line treatment of hypertension in this patient.

ABFM 2020

A 57-year-old female with a history of diabetes mellitus, hypertension, and depression sees you for a routine follow-up visit. Her vital signs include a heart rate of 88 beats/min, a blood pressure of 162/84 mm Hg, and a BMI of 32 kg/m2. The recommended antihypertensive regimen for reducing cardiovascular events in this patient is an ACE inhibitor plus

A. An α-blocker.
B. An angiotensin receptor blocker.
C. A calcium channel blocker.
D. A loop diuretic.

Answer: C.
The ACCOMPLISH trial demonstrated that an ACE inhibitor (ACEI) in combination with a calcium channel blocker (CCB) reduced both fatal and nonfatal cardiovascular events in patients with diabetes mellitus and hypertension. The benefit of an ACEI and a CCB for reducing cardiovascular events was greater than that of an ACEI and a thiazide diuretic. Evidence has shown that combination therapy for most patients should include a CCB, an ACEI or angiotensin receptor blocker (ARB), or a thiazide diuretic (SOR A). The American College of Cardiology/American Heart Association guidelines recommend against centrally acting medications such as -blockers for first-line therapy. Combining ACEIs and ARBs is not recommended, as the risk of side effects such as hyperkalemia outweighs the benefits. Loop diuretics are not considered first-line antihypertensive agents.

A 47-year-old male with obesity, hypertension, and type 2 diabetes sees you because of growth of his breasts. An examination confirms gynecomastia. Stopping which one of the following medications in this patient's current regimen would most likely result in regression of his gynecomastia?

A. Amlodipine (Norvasc).
B. Hydrochlorothiazide.
C. Liraglutide (Victoza).
D. Pioglitazone (Actos).
E. Spironolactone (Aldactone).

Answer: E.

Spironolactone has antiandrogenic properties and may cause gynecomastia in approximately 9% of male users. Stopping the medication typically leads to regression of the gynecomastia within 3 months. Amlodipine, hydrochlorothiazide, liraglutide, and pioglitazone do not have antiandrogenic properties and are not associated with gynecomastia.

A 65-year-old female with hypertension and hyperlipidemia sees you for follow-up after a visit 1 week ago because of uncontrolled hypertension and new-onset type 2 diabetes. She has smoked one pack of cigarettes per day for the past 40 years. Her medications include amlodipine (Norvasc), 10 mg daily; hydrochlorothiazide, 12.5 mg daily; and atorvastatin (Lipitor), 20 mg daily. At last week's visit you added metformin (Glucophage), 500 mg twice daily, and lisinopril (Prinivil, Zestril), 5 mg daily. The patient is physically active and asymptomatic. She is 165 cm (65 in) tall and weighs 59 kg (130 lb) with a BMI of 22 kg/m2. A physical examination is normal. A summary of her recent vital signs and laboratory data is listed below.

	One week ago	Today
Blood pressure	165/92 mm Hg	162/88 mm Hg
Pulse	72 beats/min	76 beats/min
Hemoglobin	A1c 7.2%	not measured
Glucose	183 mg/dL	156 mg/dL
Sodium	140 mEq/L (N 135–145)	141 mEq/L
Potassium	4.2 mEq/L (N 3.5–5.0)	5.1 mEq/L
BUN	12 mg/dL (N 8–25)	20 mg/dL
Creatinine	0.8 mg/dL (N 0.6–1.2)	1.4 mg/dL

You diagnose resistant hypertension and consider evaluating for an underlying cause of secondary hypertension. Which one of the following tests would most likely yield a diagnosis in this case?

A. Plasma free metanephrines.
B. A low-dose dexamethasone suppression test.
C. MR angiography of the renal arteries.
D. Polysomnography.

Answer: C.

This patient has resistant hypertension as defined by persistent uncontrolled hypertension despite the use of three adequate antihypertensives, including a diuretic. She has multiple risk factors for atherosclerotic disease, and a rise in her creatinine level after the addition of an ACE inhibitor suggests renovascular hypertension. An imaging procedure to evaluate for the presence of renovascular hypertension, such as MR angiography of the renal arteries, is indicated.Measurement of plasma free metanephrines is part of the workup for suspected pheochromocytoma. Low-dose dexamethasone suppression testing is useful for the diagnosis of Cushing syndrome. Polysomnography is the standard diagnostic test for obstructive sleep apnea, a leading cause of secondary hypertension.

You are working in an urgent care clinic when a 68-year-old male with chronic hypertension sees you for refills of his medications. He has been out of his medication for the past month and could not get an appointment with his primary care physician for refills. His blood pressure is persistently 190/115 mm Hg, even after he has rested in a quiet room for 30 minutes. His blood pressure previously had been well controlled. He has a moderate headache but otherwise feels well. An examination, including a funduscopic examination, is normal. Which one of the following management options would be most appropriate at this time?

A. Refill his usual medications and arrange for follow-up in 1 week.
B. Administer oral labetalol (Trandate) every 30 minutes until his blood pressure is <180/110 mm Hg.
C. Administer oral nifedipine (Procardia) every 30 minutes until his blood pressure is <180/110 mm Hg.
D. Administer sublingual nifedipine every 30 minutes until his blood pressure is <180/110 mm Hg.
E. Refer for immediate hospitalization for intravenous antihypertensive treatment.

Answer: B.

This patient has a hypertensive urgency, defined as symptomatic acute severe hypertension without evidence of acute end-organ injury. Hypertensive urgencies may be managed in the ambulatory setting. Emergent intravenous treatment at the hospital is not indicated. This patient should be treated with an oral agent with a fairly rapid onset of action, such as clonidine, labetalol, captopril, or prazosin. Topical nitroglycerin is also an option. Nifedipine may cause unpredictable blood pressure reduction and should be avoided. The patient may be discharged to resume his usual medications after his symptoms have improved and his blood pressure is below 160–180/110 mm Hg, with follow-up within a week.

An obese 10-year-old female has been diagnosed with hypertension and is starting treatment. Which one of the following should be the target for lowering the systolic and diastolic blood pressure?

A. <130/80 mm Hg.
B. <140/90 mm Hg.
C. <90th percentile for age, sex, and height.
D. <95th percentile for age, sex, and height.

Answer: C.

Hypertension in children is defined as a blood pressure ≥ 95th percentile for age, sex, and height on three separate office visits. The goal for treatment should be to lower the systolic and diastolic blood pressures below the 90th percentile for age, sex, and height. Once children are over 13 years of age, the target should be a blood pressure <130/80 mm Hg.

A 55-year-old male comes to your outpatient clinic for an annual health maintenance visit. He is a lifetime nonsmoker, consumes one alcoholic beverage a few days per week, and exercises at a local gym three times weekly. He reports a strong family history of cardiovascular disease. His father had a myocardial infarction (MI) at age 58, his mother had an MI at age 62, and his 58-year-old brother has been diagnosed with cardiovascular disease. The patient asks for your clinical opinion regarding the best dietary approaches for the primary prevention of cardiovascular disease. Which one of the following is your evidence-based recommendation?

A. Skip breakfast regularly to reduce total caloric intake.
B. Start -carotene supplementation.
C. Start high-dose omega-3 fatty acid supplementation.

D. Start the Dietary Approaches to Stop Hypertension (DASH) diet.
E. Start the ketogenic diet.

Answer: D.
The Dietary Approaches to Stop Hypertension (DASH) and Mediterranean diets have the best overall evidence for the primary prevention of cardiovascular disease (SOR A), and they should be regularly recommended to patients seeking to improve their risk. Other increasingly common dietary trends, such as the ketogenic diet, do not have a significant evidence base to support clear recommendations. The ketogenic diet has a strong evidence base in treatment-resistant pediatric epilepsy but not for the prevention of cardiovascular disease. Several studies have suggested that skipping breakfast may increase the risk of cardiovascular disease. The U.S. Preventive Services Task Force recommends against -carotene supplementation, due to increased risk of harm (D recommendation). There is now high-quality evidence (SOR A) that omega-3 fatty acid supplementation has no effect on cardiovascular disease.

ABFM 2019

According to the most recent American College of Cardiology/American Heart Association guidelines, hypertension is defined as a blood pressure reading greater than?

A. 120/80 mm Hg.
B. 130/80 mm Hg.
C. 135/85 mm Hg.
D. 140/90 mm Hg.
E. 150/90 mm Hg.

Answer: B.
The latest American College of Cardiology/American Heart Association guidelines promote a radical change in the management of hypertension, which they now define as a blood pressure ≥130/80 mm Hg. Elevated blood pressure is defined as a systolic pressure of 120–129 mm Hg and a diastolic pressure <80 mm Hg. A blood pressure of 130–139/80–89 mm Hg is classified as stage 1 hypertension and a systolic pressure ≥140 mm Hg or a diastolic pressure ≥90 mm Hg is classified as stage 2 hypertension.

A 65-year-old female with hypertension, osteoporosis, and GERD presents to your office for a well woman visit. She reports no new symptoms or concerns. A review of laboratory work performed prior to her visit reveals lipid levels at goal, normal glucose and sodium levels, a calcium level of 10.6 mg/dL (N 8.6–10.3), an albumin level of 4.1 g/dL (N 3.6–5.1), and a 25-hydroxyvitamin D level of 35 ng/mL (N 20–50). Her calcium level was 10.5 mg/dL on a basic metabolic panel 6 months ago. The patient’s medications include hydrochlorothiazide, 12.5 mg daily; lisinopril (Prinivil, Zestril), 10 mg daily; alendronate (Fosamax), 70 mg weekly; omeprazole (Prilosec), 20 mg daily as needed; and vitamin D, 2000 IU daily. The patient’s blood pressure is 110/60 mm Hg. An examination is normal. In addition to ordering follow-up laboratory studies and scheduling a follow-up visit in 1 month, which one of the following would be most appropriate?

A. Discontinue alendronate.
B. Discontinue hydrochlorothiazide.
C. Discontinue lisinopril.
D. Discontinue omeprazole and begin ranitidine (Zantac).
E. Increase vitamin D to 5000 IU daily.

Answer: B.

This patient has hypercalcemia with a normal albumin level. Hydrochlorothiazide can cause drug-induced hypercalcemia. Alendronate, lisinopril, and omeprazole do not cause hypercalcemia. A high vitamin D level can cause hypercalcemia, so increasing vitamin D is not appropriate at this point. A laboratory evaluation can help differentiate between PTH- and non–PTH-mediated hypercalcemia.

An 85-year-old female presents to your office to establish care. She has a history of essential hypertension, bilateral osteoarthritis of the knees, depression, and hypothyroidism. The patient feels well and has only mild pain from her osteoarthritis. A recent basic metabolic panel showed a sodium level of 132 mEq/L (N 135–145) but was otherwise unremarkable. A TSH level was 1.07 U/mL (N 0.45–4.50). Which one of the medications in this patient's current regimen is most likely causing the hyponatremia?

A. Acetaminophen.
B. Hydrochlorothiazide.
C. Levothyroxine (Synthroid).
D. Metoprolol succinate (Toprol-XL).
E. Vitamin D.

Answer: B.

Hyponatremia is an extremely common condition, affecting 4%–7% of the ambulatory population. While a number of medications can cause hyponatremia, among the most common offenders are SSRIs and thiazide diuretics. Acetaminophen and metoprolol are not known to affect sodium levels. Vitamin D deficiency has also been linked to hyponatremia so supplementation would likely improve rather than worsen hyponatremia.

A 43-year-old female comes to your office to establish care. She reports a long history of uncontrolled hypertension. She is taking several medications that have been prescribed over the years. Which one of the following medications should be discontinued 4–6 weeks prior to obtaining a plasma aldosterone/renin activity ratio?

A. Hydralazine.
B. Potassium chloride.
C. Spironolactone (Aldactone).
D. Terazosin (Hytrin).
E. Verapamil (Calan).

Answer: C.

Patients with secondary hypertension frequently take several medications and are classified as having "resistant" hypertension. It is important to recognize that many antihypertensive medications can affect the results of the aldosterone/renin ratio. An aldosterone antagonist, such as spironolactone or eplerenone, can increase renin and aldosterone levels and should be discontinued 4–6 weeks before obtaining a ratio. Angiotensin receptor blockers and ACE inhibitors can increase renin levels. Oral potassium supplements should be continued or started in patients with hypokalemia, since aldosterone biosynthesis is dependent on potassium. Medications such as hydralazine, terazosin, and verapamil may be continued or started for blood pressure control because they do not affect aldosterone or renin levels.

A 15-year-old male presents for a sports preparticipation examination. His family history includes hypertension in his mother. There are no other concerns. He does not take any medications or supplements. An examination shows a BMI at the 75th percentile for his age. His weight is 59 kg (130 lb) and his blood pressure is 130/88 mm Hg. On repeat measurements 30 minutes apart, his blood pressure is 132/90 mm Hg and 132/88 mm Hg. The remainder of the examination, including vital signs, is normal. Which one of the following would you recommend at this time?

A. Therapeutic lifestyle changes with close follow-up in 2–3 weeks.
B. Yearly blood pressure monitoring.
C. Atenolol (Tenormin), 25 mg daily.
D. Enalapril (Vasotec), 5 mg daily.
E. Hydrochlorothiazide, 12.5 mg daily.

Answer: A.

This patient has stage 1 hypertension based on his average blood pressure of 131/88 mm Hg after three measurements. He is asymptomatic so the initial recommendation is therapeutic lifestyle changes and close follow-up in 2–3 weeks (SOR C). If his blood pressure remains elevated, an evaluation for secondary hypertension would be appropriate. Medication would be appropriate for stage 1 hypertension with either evidence of end-organ disease or persistent hypertension after a trial of therapeutic lifestyle changes or progression to stage 2 hypertension (SOR C). Thiazide diuretics or ACE inhibitors would be appropriate choices for initial treatment. -Blockers are no longer considered first-line treatment for hypertension in adolescents or children. This patient would need blood pressure monitoring at every visit due to his elevated blood pressure.

ABFM 2018 - 2015

According to the guidelines developed by the JNC 8 panel, which one of the following should NOT be used as a first-line treatment for hypertension?

A. ACE inhibitors.
B. Angiotensin receptor blockers.
C. Calcium channel blockers.
D. β-Blockers.
E. Thiazide-type diuretics.

Answer: D.

In 2014 new evidence-based guidelines for blood pressure management were published by the panel members of the Eighth Joint National Committee (JNC 8). They looked only at randomized, controlled trials that compared one class of antihypertensive agent to another to develop the treatment recommendations. ACE inhibitors, angiotensin receptor blockers (ARBs), calcium channel blockers, and thiazide-type diuretics all yielded comparable effects on overall mortality and cardiovascular, cerebrovascular, and kidney outcomes. They are all recommended for initial treatment of high blood pressure in the nonblack population, including patients with diabetes mellitus. $-Blockers were not recommended for the initial treatment of hypertension because one study found there was a higher rate of the primary composite outcome of cardiovascular death, myocardial infarction, or stroke with use of these drugs compared to the use of an ARB.

A 70-year-old male who recently moved to your area sees you for the first time. He has a previous history of myocardial infarction, has a pacemaker, and has hypertension that had been well controlled on hydrochlorothiazide and atenolol (Tenormin) for several years. About 6 months ago his previous physician had to add amlodipine (Norvasc) to his regimen. On examination he has mild arteriolar narrowing in his fundi and there is a systolic bruit just to the right of his umbilicus. He has a log of home blood pressure readings that average 138/88 mm Hg for the past 2 months. His serum creatinine level has gone from 1.2 mg/dL to 1.4 mg/dL (N 0.6–1.2) in the past 2 months. Which one of the following would be most appropriate at this time?

A. Referral for stent placement.
B. Scheduling an arteriogram.
C. A captopril renal scan.
D. Adding losartan (Cozaar) to his regimen.
E. Continued monitoring of serum creatinine.

Answer: E.

Renal artery stenosis may be present in as many as 5% of patients with hypertension. It is often seen in those who have coronary artery disease and/or peripheral vascular disease. Hypertension requiring four or five drugs to control, abdominal bruits, and development of hyperkalemia or renal insufficiency after initiating therapy with an ACE inhibitor can all point toward renal artery stenosis as a diagnosis. For patients with renal artery stenosis who have good control, no testing is necessary other than monitoring renal function, particularly if an ACE inhibitor or ARB is part of the regimen. Screening tests recommended by clinical guidelines include duplex ultrasonography, CT angiography, or MR cystography (SOR B). Captopril renography was used in the past but is no longer recommended. In the 1990s uncontrolled studies were done that suggested that either stenting or angioplasty resulted in significant blood pressure reduction and reduced renal failure. However, a clinical trial has shown that stenting did not benefit patients when added to comprehensive multifactorial medical therapy.

You see a 27-year-old male with autosomal dominant polycystic kidney disease. He has no other medical problems and his renal function has always been normal on annual testing. Today the patient reports his blood pressure at home has been 142–150/84–90 mm Hg. His blood pressure at this visit is 145/88 mm Hg. Which one of the following medications is preferred for the initial management of hypertension in this patient?

A. Amlodipine (Norvasc).
B. Chlorthalidone.
C. Furosemide (Lasix).
D. Lisinopril (Prinivil, Zestril).

Answer: D.

Hypertension is the most common manifestation of autosomal dominant polycystic kidney disease and it also contributes to worsening renal function and an increased risk for cardiovascular disease and death. ACE inhibitors such as lisinopril are first-line agents because they have renal protective benefits in addition to their effects on blood pressure. Some studies have suggested they help slow the decline in renal function and help to prevent left ventricular hypertrophy (more so than diuretics or calcium channel blockers). Angiotensin receptor blockers should be reserved for those who cannot tolerate ACE inhibitors.

A 60-year-old male with a long-standing history of hypertension seeks your advice about pain relief from his osteoarthritis. He has tried acetaminophen and topical capsaicin cream without much benefit. He is concerned about media reports of NSAIDs causing heart problems and is unsure which ones would be safest for him to use. Based on current evidence, which one of the following NSAIDs would you recommend as being LEAST likely to be associated with an increased risk of myocardial infarction?

A. Celecoxib (Celebrex).
B. Diclofenac (Zorvolex).
C. Ibuprofen.
D. Meloxicam (Mobic).
E. Naproxen (Naprosyn).

Answer: E.

NSAIDs cause an elevation of blood pressure due to their salt and water retention properties. This effect can also lead to edema and worsen underlying heart failure. In addition, all NSAIDs can have a deleterious effect on kidney function and can worsen underlying chronic kidney disease, in addition to precipitating acute kidney injury. Celecoxib, ibuprofen, meloxicam, and diclofenac are associated with an increased risk of cardiovascular adverse effects and myocardial infarction, compared with placebo. However, naproxen has not been associated with an increased risk of myocardial infarction and is therefore preferred over other NSAIDs in patients with underlying coronary artery disease risk factors (SOR B).

A 50-year-old female sees you for follow-up of uncontrolled hypertension. Her recent blood pressure measurements average >175/105 mm Hg. The patient has diabetes mellitus and a BMI of 32.3 kg/m2. Physical findings are otherwise noncontributory. Recent laboratory studies include three different potassium levels <3.5 mEq/L (N 3.5–5.0) despite increasing dosages of oral potassium supplements, with the dosage now at 100 mEq daily. Which one of the following would be most appropriate at this point?

A. Measurement of peripheral aldosterone concentration and peripheral renin activity.

B. CT of the abdomen.
C. Renal CT angiography.
D. An aldosterone suppression test.

Answer: A.

Hyperaldosteronism, usually caused by a hyperaldosterone-secreting adrenal mass, has to be considered in a middle-aged patient with resistant hypertension and hypokalemia. Peripheral aldosterone concentration (PAC) and peripheral renin activity (PRA), preferably after being upright for 2 hours, are the preferred screening tests for hyperaldosteronism. A PAC >15 ng/dL and a PAC/PRA ratio >20 suggest an adrenal cause. Abdominal CT may miss adrenal hyperplasia or a microadenoma. Renal CT angiography is useful for detecting renal artery stenosis. If the PAC/PRA is abnormal, an aldosterone suppression test should be ordered.

Which one of the following is most likely to be associated with resistant hypertension in adults?

A. Obstructive sleep apnea.
B. Primary aldosteronism.
C. Renal artery stenosis.
D. Renal parenchymal disease.
E. Thyroid disease.

Answer: A.

Obstructive sleep apnea is found in 30%–40% of hypertensive patients and 60%–70% of patients with resistant hypertension, whereas primary aldosteronism is present in only 7%–20% of patients with resistant hypertension. Renal artery stenosis is seen in 2%–24% of cases of resistant hypertension in various studies, renal parenchymal disease in 2%–4%, and thyroid disease in less than 1%.

A 28-year-old gravida 1 para 0 at 39 weeks gestation presents for routine outpatient obstetric care and is found to have a blood pressure of 145/95 mm Hg. A complete review of systems is notable only for chronic low back pain causing poor sleep. The physical examination is normal, including a nontender, gravid uterus and a fetal heart rate of 150 beats/min. The cervical examination reveals firm consistency, 1 cm dilation, 50% effacement, and –3 station. The patient's blood pressure is checked 5 hours later and is 142/94 mm Hg. Based on the 2013 ACOG guidelines for management of hypertension in pregnancy, which one of the following should be the next step in management?

A. Admit the patient for induction of labor.
B. Measure 24-hour urine protein, with induction of labor if the level exceeds 300 mg.
C. Begin oral nifedipine (Procardia) and recheck her blood pressure in 24–48 hours.
D. Place the patient on strict bed rest and check her blood pressure twice weekly.
E. Begin twice-weekly office visits with assessment for preeclampsia.

Answer: A.

The 2013 ACOG guideline recommends induction of labor for gestational hypertension after 37 weeks. Identifying elevated urine protein is not required for this decision, as gestational hypertension and preeclampsia without severe features are managed in the same way at 39 weeks gestation. Twice-weekly office visits with assessment of blood pressure and the other tests mentioned may be appropriate for patients at less than 37 weeks gestation. Bed rest is no longer recommended for control of hypertension in pregnancy. Oral antihypertensives are used only at higher blood pressure readings in the setting of chronic hypertension.

A 34-year-old G2P1+1 at 11 weeks gestation comes to your office to establish care for her pregnancy. In reviewing her history you find that her first pregnancy was complicated by preeclampsia and she required induction of labor at 33 weeks. She also has chronic hypertension treated with chlorthalidone. Her blood pressure today is 128/78 mm Hg. Which one of the following medications, if started today, will lower her risk of preeclampsia in this pregnancy?

A. Aspirin.
B. Calcium.
C. Labetalol.
D. Nifedipine (Procardia).
E. Vitamin E.

Answer: A.

A 2013 update from the American College of Obstetricians and Gynecologists on hypertension in pregnancy summarizes the evidence regarding prevention of preeclampsia. The only medication with sufficient evidence to support its routine use is aspirin at dosages of 60–80 mg daily. In a high-risk population, defined as women with a history of preeclampsia in two or more pregnancies or a history of preeclampsia with delivery at <34 weeks, the risk of preeclampsia is sufficiently high to justify the use of aspirin, with a number needed to treat of 50 to prevent one case of preeclampsia. Calcium supplementation may help prevent preeclampsia in women with a very low calcium intake, but in the United States and other developed countries routine calcium supplementation has not been found to provide a benefit with regard to preeclampsia. Vitamin E has also been studied and found to be of no benefit. Antihypertensive agents such as labetalol and nifedipine may be used to control blood pressure in pregnant patients but they have not been shown to reduce the risk of preeclampsia.

A healthy 83-year-old female presents for an annual Medicare visit. Her blood pressure is 165/95 mm Hg on initial evaluation today and 160/92 mm Hg on repeat measurement. She has no health complaints. The JNC 8 panel recommends which one of the following as the goal blood pressure for this patient?

A. <135/85 mm Hg.
B. <140/90 mm Hg.
C. <150/90 mm Hg.
D. <160/90 mm Hg.
E. <160/100 mm Hg.

Answer: C.

In general, all patients with hypertension, regardless of age, benefit from treatment. Patients ≥80 years of age who are healthy and functionally independent should be treated according to current recommendations for patients >65 years old. Available guidelines recommend a target blood pressure of <150/90 mm Hg unless the patient is frail or has numerous comorbidities. In these cases, the target blood pressure should be determined on a case-bycase basis (SOR B).

A 44-year-old male presents to the emergency department in the evening with facial, lip, and tongue edema that has been gradually progressing over the last few hours. He was started on lisinopril (Prinivil, Zestril) earlier today for mild hypertension. He does not have a rash or pruritus. He reports tightness in his throat and, although he is moving air well at this time, you do note some mild stridor. Which one of the following is most likely to prevent the need for intubation?

A. Epinephrine.
B. An antihistamine such as diphenhydramine (Benadryl).
C. An angiotensin receptor blocker such as losartan (Cozaar).
D. A bradykinin receptor antagonist such as icatibant (Firazyr).
E. A corticosteroid such as methylprednisolone (Medrol).

Answer: D.
Less than 1% of patients started on an ACE inhibitor develop angioedema, but some studies have reported that up to 10% of these patients require intubation. This type of angioedema is due to increased bradykinin rather than histamine, and antihistamines, anticholinergics, corticosteroids, and epinephrine would not be effective. Icatibant is a bradykinin receptor type 2 blocker and is recommended in patients with laryngeal angioedema compromising airway function (level 2 evidence). Angiotensin receptor blockers, although probably not harmful, would not be helpful.

According to the JNC 8 panel guidelines, which one of the following would be first-line drug therapy for hypertension in an African-American male who has no other medical problems?

A. An ACE inhibitor.
B. An aldosterone antagonist.
C. An "-blocker.
D. Hydralazine.
E. A thiazide-type diuretic.

Answer: E.
The 2014 evidence-based guideline from the JNC 8 panel recommends that in the general African-American population, including those with diabetes mellitus, initial antihypertensive treatment should include a thiazide-type diuretic or calcium channel blocker (for general African-American population: SOR B; for African-American patients with diabetes: SOR C).

A 45-year-old Hispanic female presents to your office for follow-up of a blood pressure measurement of 155/95 mm Hg at a health fair screening. She has no significant past medical history. She reports that she exercises daily for 30 minutes, follows a low-salt diet, and rarely drinks alcohol. Her blood pressure in the office today is 154/95 mm Hg. Which one of the following medications would be most appropriate for this patient?

A. Chlorthalidone.
B. Clonidine (Catapres).
C. Doxazosin (Cardura).
D. Metoprolol succinate (Toprol-XL).
E. Spironolactone (Aldactone).

Answer: A.
Thiazide diuretics such as chlorthalidone are considered a first-line therapy for hypertension. β-Blockers, aldosterone antagonists, and other antihypertensive medications may be used as add-on therapy to reach blood pressure goals.

You see a 90-year-old patient with elevated blood pressure. Which one of the following is an expected physiologic change in elderly patients?

A. Increased renal blood flow.
B. Increased diastolic blood pressure.
C. Decreased systolic blood pressure.
D. Decreased peripheral resistance.
E. Wider pulse pressure.

Answer: E.
Age-related physiologic differences such as wider pulse pressure should be a consideration when treating hypertension in the elderly. These patients also have lower cardiac output, higher peripheral resistance, lower intravascular volume, and lower renal blood flow compared with younger patients. Pulse pressure (the difference between systolic blood pressure and diastolic blood pressure) is a measure of the degree of age-related vascular stiffness and is a risk factor for coronary artery disease events. With increasing age the strongest predictor of coronary artery disease gradually shifts from diastolic blood pressure to systolic blood pressure, and then to pulse pressure. Systolic blood pressure rises gradually throughout adult life, whereas diastolic blood pressure peaks and plateaus in late middle age, and declines slightly thereafter. Diastolic hypertension occurs in <10% of all patients with hypertension after age 70.

Which one of the following is the strongest risk factor for primary hypertension in children and adolescents?

A. A family history of hypertension.
B. Elevated BMI.
C. Male sex.

D. African-American ethnicity.

Answer: B.

There is an increasing prevalence of hypertension in children and adolescents. BMI is the strongest risk factor for hypertension in this age group. Other risk factors include a family history of hypertension, low birth weight, male sex, and certain ethnic backgrounds. The prevalence of hypertension in obese children is 11%, which is more than double that of the general pediatric population (reported at 1%–5%).

A 28-year-old gravida 2 para 1 visits your office for routine prenatal care at 36 weeks gestation. Today she reports some mildly increased lower extremity edema without associated headache, visual changes, or right upper quadrant pain. She has not noticed any leaking amniotic fluid and has only had occasional mild uterine contractions. Her blood pressure has been normal at past visits, but on examination today it is 144/92 mm Hg. Repeat measurement confirms the blood pressure reading, and a urine dipstick shows trace protein. Her fundal height measures 36 cm, fetal heart tones have a rate of 134 beats/min, and Leopold's maneuvers indicate that her fetus is in a cephalic position. Laboratory tests reveal a normal platelet count, normal transaminase and creatinine levels, and a normal urine protein/creatinine ratio. Your plan at this time should include which one of the following?

A. Immediate induction of labor.
B. Home blood pressure and symptom monitoring, and induction of labor at 37 weeks gestation.
C. Home blood pressure and symptom monitoring, weekly office visits and laboratory evaluation, and induction of labor at 39 weeks gestation.
D. Home blood pressure and symptom monitoring, weekly office visits and laboratory evaluation, and induction of labor at 40 weeks gestation.
E. Home blood pressure and symptom monitoring, weekly office visits and laboratory evaluation, and induction of labor at 41 weeks gestation.

Answer: B.

This patient has gestational hypertension. She has no findings consistent with a diagnosis of preeclampsia, although she is now at risk for this condition. Current evidence suggests that, in the absence of preeclampsia with severe features (blood pressure >160/110 mm Hg, thrombocytopenia, impaired liver function, renal insufficiency, pulmonary edema, cerebral edema, or visual disturbance), pregnancy can safely be continued until 37 weeks gestation. At that point delivery is recommended in order to avoid the risks associated with gestational hypertension, which include abruption, intrauterine growth restriction, and progression to preeclampsia and eclampsia.

An asymptomatic 46-year-old male with autosomal dominant polycystic kidney disease sees you for a routine visit. His vital signs in the office include a blood pressure of 152/93 mm Hg, a heart rate of 82 beats/min, a respiratory rate of 17/min, a temperature of 37.0°C (98.6°F), and an oxygen saturation of 99% on room air. His glomerular filtration rate is 49 mL/min/1.73 m2. Which one of the following is the preferred initial therapy for controlling this patient's blood pressure?

A. Amlodipine (Norvasc).
B. Furosemide.
C. Lisinopril (Prinivil, Zestril).
D. Metoprolol.
E. Spironolactone (Aldactone).

Answer: C.

Autosomal dominant polycystic kidney disease (ADPCKD) is the most common genetic kidney disease and accounts for 4.7% of end-stage kidney disease cases in America. Many patients with ADPCKD are asymptomatic, but early symptoms can include flank pain, gross hematuria, or recurrent urinary tract infections. The most common extrarenal manifestation of ADPCKD is hypertension, which can precipitate cardiovascular dysfunction, including left ventricular hypertrophy. Thus, early diagnosis and management of hypertension is crucial. The goal blood pressure should be <140/90 mm Hg in patients under the age of 60. All ADPCKD patients eventually develop a loss of renal function, and approximately 80% develop end-stage renal disease by age 70. An ACE inhibitor is the recommended first-line therapy (SOR C), so lisinopril is the best choice for this patient. Angiotensin receptor blockers are acceptable in patients who cannot tolerate ACE inhibitors.

A 52-year-old male was recently diagnosed with mild essential hypertension. His average blood pressure over several repeated weekly readings is 142/92 mm Hg. He now comes to your office to discuss a management plan. He is particularly interested in trying to manage his hypertension nonpharmacologically if possible. Which one of the following nonpharmacologic interventions should you recommend for this patient?

A. Limit table salt consumption to 500 mg/day.
B. Consume 3 glasses of red wine daily.
C. Consume a high-protein diet.
D. Monitor home blood pressure readings.
E. Start a yoga program.

Answer: D.

Self-measured blood pressure monitoring, with or without additional support (e.g., education, counseling, telemedicine, home visits, Web-based logging), lowers blood pressure when compared with usual care, although the benefits beyond 12 months are not clear (SOR A). Limiting sodium intake to 2400 mg/day (approximately 1 teaspoon of table salt) is recommended to lower blood pressure. Additional benefit occurs with a limit of 1500 mg/day (SOR B). A diet that emphasizes vegetables, fruits, and whole grains is also recommended to lower blood pressure (SOR A), as well as limiting alcohol consumption to no more than 2 drinks/day for men, and 1 drink/day for women (SOR C). Because of mixed results from therapeutic trials and many limitations to the trials, the American Heart Association does not recommend either yoga or acupuncture to lower blood pressure.

A 42-year-old female continues to have elevated blood pressure while on three antihypertensive agents. You are concerned that she may have idiopathic adrenal hyperplasia or an aldosterone-producing adenoma. Which one of the following would be the most appropriate laboratory test?

A. Serum cortisol.
B. An aldosterone: renin ratio.
C. 17-Hydroxyprogesterone.
D. A dexamethasone suppression test.
E. Renal ultrasonography.

Answer: B.

Up to 28% of patients may be defined as having resistant hypertension (not controlled on three drugs or controlled on four or more drugs). Primary aldosteronism is present in up to 5%–10% of all hypertensive patients and 7%–20% of those with resistant hypertension. This may be due to bilateral adrenal hyperplasia or a unilateral aldosterone-secreting adenoma, which can be diagnosed if there is elevated serum aldosterone in the presence of suppressed renin levels. A cortisol level and a dexamethasone suppression test are appropriate tests for Cushing syndrome. A 17-hydroxyprogesterone level tests for congenital adrenal hyperplasia. Renal ultrasonography will not adequately screen for any of these conditions.

A 23-year-old gravida 1 para 0 at 35 weeks gestation presents with a 2-day history of ankle swelling and headache. She denies any abdominal pain or visual disturbances. On examination you note a fundal height of 35 cm, a fetal heart rate of 140 beats/min, 2+ lower extremity edema, and a blood pressure of 144/92 mm Hg. A urine dipstick shows 1+ proteinuria. A cervical examination reveals 2 cm dilation, 90% effacement, –1 station, and vertex presentation. You send her to labor and delivery triage for further evaluation. Over the next 4 hours she has a reactive nonstress test and her blood pressure ranges from 142/90 mm Hg to 148/96 mm Hg. Laboratory results show a urine protein to creatinine ratio of 0.4 (N <0.3), normal BUN and creatinine levels, normal liver enzyme and LDH levels, normal hemoglobin and hematocrit levels, and a platelet count of 95,000/mm3 (N 150,000–350,000). Which one of the following would be the most appropriate next step in the management of this patient?

A. A biophysical profile.
B. Ultrasonography to check for fetal intrauterine growth restriction.
C. Initiation of antihypertensive treatment.
D. Immediate induction of labor.
E. Immediate cesarean delivery.

Answer: D.

This patient most likely has preeclampsia, which is defined as an elevated blood pressure and proteinuria after 20 weeks gestation. The patient needs further evaluation, including a 24-hour urine for quantitative measurement of protein or a spot urine protein to creatinine ratio, blood pressure monitoring, and laboratory evaluation that includes hemoglobin, hematocrit, a platelet count, and serum levels of transaminase, creatinine, albumin, LDH, and uric acid. A peripheral smear and coagulation profiles also may be obtained. Antepartum fetal testing, such as a nonstress test to assess fetal well-being, would also be appropriate. Ultrasonography should be performed to assess for fetal intrauterine growth restriction, but only after an initial laboratory and fetal evaluation. Delivery is the definitive treatment for preeclampsia. The timing of delivery is determined by the gestational age of the fetus and the severity of preeclampsia in the mother. Vaginal delivery is preferred over cesarean delivery, if possible, in patients with preeclampsia. It is not necessary to start this patient on antihypertensive therapy at this point. An obstetric consultation should be considered for patients with preeclampsia.

Which one of the following community health programs best fits the definition of secondary prevention?

A. An antismoking education program at a local middle school.
B. Blood pressure screening at a local church.
C. A condom distribution program.
D. Screening patients with diabetes mellitus for microalbuminuria.

Answer: B.
Prevention traditionally has been divided into three categories: primary, secondary, and tertiary. Primary prevention targets individuals who may be at risk to develop a medical condition and intervenes to prevent the onset of that condition. Examples include childhood vaccination programs, water fluoridation, antismoking programs, and education about safe sex. Secondary prevention targets individuals who have developed an asymptomatic disease and institutes treatment to prevent complications. Examples include routine Papanicolaou tests and screening for hypertension, diabetes mellitus, or hyperlipidemia. Tertiary prevention targets individuals with a known disease, with the goal of limiting or preventing future complications. Examples include screening patients with diabetes for microalbuminuria, rigorous treatment of diabetes mellitus, and post–myocardial infarction prophylaxis with -blockers and aspirin.

A 72-year-old female taking hydrochlorothiazide for hypertension develops trigeminal neuralgia and you start her on carbamazepine (Tegretol). She is at risk for which one of the following metabolic consequences?

A. Calcium pyrophosphate deposition.
B. Hypercalcemia.
C. Hyponatremia.
D. Hyperuricemia.

Answer: C.
Elderly patients, especially those taking hydrochlorothiazide, are at risk for developing hyponatremia while taking carbamazepine. Carbamazepine is one of the medications that can cause the syndrome of inappropriate antidiuretic hormone secretion, as it interferes with the ability to dilute the urine. It does not lead to the other derangements listed (SOR A).

36-year-old female has had elevated blood pressure readings since establishing care with you 6 months ago. You have increased her antihypertensive therapy monthly in an attempt to treat her hypertension, and she is currently taking the maximum dosage of three antihypertensive medications from different classes. She confirms that her blood pressure is also elevated at home, typically ranging from 155/92 mm Hg to 165/98 mm Hg. She is otherwise well. She does not have chest pain, shortness of breath, headaches, daytime sleepiness, or lower extremity edema. Her family history is significant for hypertension diagnosed in her father in his 50s. On examination the patient has a blood pressure of 168/95 mm Hg. Her pulse rate is 78 beats/min and her BMI is 28.1 kg/m2. She has a normal cardiac examination and no peripheral edema. You order laboratory testing, with the following significant findings:

Sodium -- 144 mEq/L (N 136–142)
Potassium --- 3.0 mEq/L (N 3.5–5.0)
Creatinine -- 0.72 mg/dL (N 0.6–1.2)
Fasting glucose -- 98 mg/dL
TSH -- 1.46 U/mL (N 0.4–4.2)
EKG -- Normal

Which one of the following additional tests is most likely to reveal the cause of her hypertension?

A. A dexamethasone suppression test.
B. Plasma aldosterone/renin activity.
C. Plasma free metanephrines.
D. A sleep study.
E. Renal ultrasonography.

Answer: B.

In young patients with hypertension it is important to consider secondary causes in addition to the more common essential hypertension. This patient's relatively young age and elevated home blood pressure readings despite drug therapy warrant further evaluation. The initial evaluation showed hypokalemia, which suggests an endocrine cause of hypertension, specifically hyperaldosteronism. Other potential causes of secondary hypertension include coarctation of the aorta, renal artery stenosis, thyroid disorders, obstructive sleep apnea, pheochromocytoma, and Cushing syndrome. Each of these presents with clinical findings that help to distinguish them from other potential causes, and the laboratory evaluation would depend on the suspected cause.

A 65-year-old white female is diagnosed with hypertension. She has no significant past medical history. According to the JNC 8 panel, which one of the following would be an appropriate systolic blood pressure goal for this patient?

A. <120 mm Hg.
B. <130 mm Hg.
C. <140 mm Hg.
D. <150 mm Hg.
E. <160 mm Hg.

Answer: D.

In 2013 the members of the Eighth Joint National Committee (JNC 8) updated guidelines for the management of hypertension, recommending treatment of systolic blood pressure to <150 mm Hg in patients >60 years of age without comorbid conditions, based on evidence that a systolic blood pressure 150 mm Hg reduces rates of cardiovascular disease, stroke, and death (SOR A). While this was a recent recommendation, the evidence supporting the beneficial effects of lowering blood pressure is decades old. The JNC 8 panel concluded that there is insufficient evidence to support a specific systolic blood pressure goal in adults <60 years of age. A

Cochrane review concluded that treatment of patients with mild hypertension (systolic blood pressure of 140–159 mm Hg and/or diastolic blood pressure of 90– 99 mm Hg) did not reduce morbidity or mortality compared with placebo (SOR A).

A 53-year-old male sees you for follow-up of his hypertension. His medical history includes prediabetes and gout, and he is currently taking lisinopril (Prinivil, Zestril), 40 mg daily, to control his blood pressure. His blood pressure after resting is 148/86 mm Hg. Laboratory findings include a serum creatinine level of 0.8 mg/dL (N 0.6–1.2) and a serum potassium level of 4.5 mEq/L (N 3.5–5.1). Which one of the following would be the most appropriate management of this patient's hypertension?

A. No change in medication.
B. Add amlodipine (Norvasc).
C. Add hydrochlorothiazide.
D. Add losartan (Cozaar).
E. Add metoprolol succinate (Toprol-XL).

Answer: B.
First-line agents for hypertension include ACE inhibitors, and calcium, angiotensin receptor blockers, thiazide diuretics channel blockers. Hydrochlorothiazide would be relatively contraindicated due to the patient's gout. Losartan, an angiotensin receptor blocker, should not be added because the patient is taking an ACE inhibitor. Metoprolol succinate, a -blocker, is not a first-line agent for blood pressure unless there is another indication. Such as systolic heart failure or migraine prophylaxis.

A 33-year-old female with a BMI of 35.2 kg/m2 presents to your office for follow-up of her recently documented blood pressure elevation. Her blood pressure is elevated again today. You diagnose hypertension and decide to start pharmacologic therapy in addition to lifestyle modifications. Which one of the following agents would be the best first-line choice for this patient?

A. Verapamil (Calan).
B. Clonidine (Catapres).
C. Hydrochlorothiazide.
D. Metoprolol tartrate (Lopressor).
E. Spironolactone (Aldactone).

Answer: C.
The 2014 evidence-based guideline from the panel members appointed to the Eighth Joint National Committee (JNC 8) makes few suggestions regarding preferred initial agents for the treatment of hypertension. Of the options listed, only hydrochlorothiazide is a reasonable option for first-line treatment. Verapamil is rarely used for blood pressure control.

A 55-year-old male comes to your office for a routine visit due to an insurance change. He has no health complaints and the physical examination is unremarkable except for some seborrheic keratoses, onychomycosis, and a blood pressure of 171/90 mm Hg. On two subsequent visits his blood pressure is 168/92 mm Hg and 171/91 mm Hg and you recommend treatment. The patient states that he will not take any prescription medications, as he believes they are harmful. Which one of the following nonpharmacologic measures would be appropriate to recommend for this patient?

A. Limiting sodium intake to 4 g per day.
B. Limiting alcohol to no more than 3 drinks per day.
C. Daily coenzyme Q10.
D. Daily magnesium supplements.
E. Moderate physical activity for 150 min or more per week.

Answer: E.
Although pharmacologic therapy is the mainstay of treatment for hypertension in adults, there are several nonpharmacologic options that have been shown to lower blood pressure. Moderate exercise 3–4 times per week for 40 minutes or more has been shown to lower high blood pressure, with the greatest effect seen when patients exercise 150 minutes or more per week. Limiting sodium intake to 2400 mg/day decreases blood pressure, and further effects are seen when it is limited to 1500 mg/day. Alcohol should be limited to no more than two drinks per day in men, and one drink per day in women. Magnesium and coenzyme Q10 do not lower blood pressure.

At a routine visit, a 40-year-old female asks about beginning an exercise regimen. She has a family history of heart disease and hypertension. She currently has no medical problems, but she is sedentary. Which one of the following would be the most appropriate recommendation for this patient?

A. A baseline EKG and rhythm strip.
B. An exercise stress test prior to beginning exercise.
C. Jogging for 30 minutes twice a week.
D. Fast walking for 30 minutes 5 or more days per week.

Answer: D.
This patient would benefit from exercise to prevent or delay the onset of heart disease and hypertension, and to manage her weight. Exercise stress testing is not specifically indicated for this patient. Current recommendations are for healthy adults to engage in 30 minutes of accumulated moderate-intensity physical activity on 5 or more days per week.

A 45-year-old African-American male returns to your clinic to evaluate his progress after 6 months of dedicated adherence to a diet and exercise plan you prescribed to manage his blood pressure. His blood pressure today is 148/96 mm Hg. He is not overweight and he does not have other known medical conditions or drug allergies. Which one of the following would be the most appropriate initial antihypertensive treatment option for this patient?

A. Chlorthalidone.
B. Hydralazine.
C. Lisinopril (Prinivil, Zestril).
D. Losartan (Cozaar).
E. Metoprolol.

Answer: A.
Lifestyle modifications addressing diet, physical activity, and weight are important in the treatment of hypertension, particularly for African-American and Hispanic patients. When antihypertensive drugs are also required, the best options may vary according to the racial and ethnic background of the patient. The presence or absence of comorbid conditions is also important to consider. For African Americans, thiazide diuretics and calcium channel blockers, both as monotherapy and as a component in multidrug regimens, have been shown to be more effective in lowering blood pressure than ACE inhibitors, angiotensin II receptor blockers, or -blockers, and should be considered as first-line options over the other classes of antihypertensive drugs unless a comorbid condition is present that would be better addressed with a different class of drugs. Racial or ethnic background should not be the basis for the exclusion of any drug class when multidrug regimens are required to reach treatment goals.

A 42-year-old male with hypertension and hyperlipidemia sees you for a routine health maintenance examination. His blood pressure is 185/105 mm Hg. He does not have any current symptoms, including headache, chest pain, edema, or shortness of breath. He is adherent to his current medication regimen, which includes lisinopril (Prinivil, Zestril), 10 mg daily, and simvastatin (Zocor), 20 mg at night. A thorough history and physical examination are both unremarkable. ?Which one of the following would be the most appropriate next step?

A. A 30-minute rest period followed by a repeat blood pressure reading.
B. Clonidine (Catapres), 0.2 mg given in the office.
C. A comprehensive metabolic panel, fasting lipid profile, and TSH level.
D. A stress test.
E. Hospital admission for blood pressure reduction.

Answer: A.
The first step in the management of severe hypertension is determining whether a hypertensive emergency is present. A thorough history and physical examination are crucial (SOR C). Severe hypertension (blood pressure >180 mm Hg systolic or >110 mm Hg diastolic) with end-organ damage constitutes a hypertensive emergency. A physical examination should center on evaluating for papilledema, neurologic deficits, respiratory compromise, and chest pain. If end-organ damage is present the patient should be hospitalized for monitored blood pressure reduction and further diagnostic workup. If endorgan damage is not present and the physical examination is otherwise normal, a 30-minute rest with reevaluation is indicated. Approximately 30% of patients will improve to an acceptable blood pressure without treatment (SOR C). Home medications should then be adjusted with outpatient follow-up and home blood pressure monitoring (SOR A). Short-acting antihypertensives are indicated if mild symptoms are noted such as headache, lightheadedness, nausea, shortness of breath, palpitations, anxiety, or epistaxis. Diagnostic testing is not immediately indicated for

asymptomatic patients (SOR C). A basic metabolic panel or other testing should be considered if mild symptoms are present. Aggressive lowering of blood pressure can be detrimental and a gradual reduction over days to weeks is preferred (SOR C).

Which one of the following antihypertensive drugs may reduce the severity of sleep apnea?

A. Amlodipine (Norvasc).
B. Hydralazine.
C. Lisinopril (Prinivil, Zestril).
D. Metoprolol.
E. Spironolactone (Aldactone).

Answer: E.
Diuretics lessen the severity of obstructive sleep apnea and reduce blood pressure. Aldosterone antagonists offer further benefit beyond that of traditional diuretics. Resistant hypertension is common in patients with obstructive sleep apnea. Resistant hypertension is also associated with higher levels of aldosterone, which can lead to secondary pharyngeal edema, increasing upper airway obstruction.

A 21-year-old female is being evaluated for secondary causes of refractory hypertension. Which one of the following would be most specific for fibromuscular dysplasia?

A. A serum creatinine level.
B. An aldosterone:renin ratio.
C. 24-hour urine for metanephrines.
D. Renal ultrasonography.
E. Magnetic resonance angiography of the renal arteries.

Answer: E.
In young adults diagnosed with secondary hypertension, evaluation for fibromuscular dysplasia of the renal arteries with MR angiography or CT angiography is indicated (SOR C). The aldosterone/renin ratio is the most sensitive test to diagnose primary hyperaldosteronism. Renal ultrasonography is an indirect test that is not as sensitive or specific for fibromuscular dysplasia. Serum creatinine elevation shows renal involvement but does not identify the cause. Testing for metanephrines is indicated only if a pheochromocytoma is suspected.

A 54-year-old male comes to your office to establish care. He has a past history of hypertension treated with lisinopril (Prinivil, Zestril) and hydrochlorothiazide but has not taken his medications for over a year. He does not have any symptoms, including chest pain, shortness of breath, or headache. On examination his blood pressure is 200/115 mm Hg on two separate readings taken 5 minutes apart. The remainder of the physical examination is normal. Which one of the following management options would be most appropriate?

A. Institute out-of-office monitoring with an ambulatory device and follow up in 2 weeks.
B. Restart the patient's previous antihypertensive medications and follow up within 1 week.
C. Administer a short-acting antihypertensive medication in the office to lower his blood pressure to <160/100 mm Hg.
D. Hospitalize for hypertensive emergency.

Answer: B.

This patient has severe asymptomatic hypertension (systolic blood pressure 180 mm Hg or diastolic blood pressure 110 mm Hg). If there were signs or symptoms of acute target organ injury, such as neurologic deficits, altered mental status, chest pain, shortness of breath, or oliguria, hospitalization for a hypertensive emergency would be indicated. Because this patient was asymptomatic and has a known history of hypertension, restarting his prior antihypertensive regimen and following up in 2 weeks would be the most appropriate management option. If he had no past history of hypertension it would be reasonable to consider out-of-office monitoring with an ambulatory device for 2 weeks before initiating treatment. In the absence of acute target organ injury, blood pressure should be gradually lowered to less than 160/100 mmHg over several days to weeks. Aggressively lowering blood pressure can lead to adverse events such as myocardial infarction, cerebrovascular accident, or syncope, so administering a short-acting antihypertensive medication in the office should be reserved for the management of hypertensive emergencies.

In a patient presenting with truncal obesity, hypertension, type 2 diabetes mellitus, hirsutism, osteopenia, and skin fragility, which one of the following tests is needed to confirm the diagnosis of Cushing syndrome?

A. A dexamethasone suppression test.
B. Inferior petrosal sinus sampling.
C. Plasma corticotropin.
D. Plasma free cortisol.
E. Urinary free cortisol.

Answer: E.

In a patient presenting with obesity, hypertension, type 2 diabetes mellitus, and hirsutism, who also has thin skin and osteopenia, an elevated 24-hour collection showing high urinary free cortisol confirms the presence of Cushing syndrome. The dexamethasone suppression test, though still commonly used, no longer has a place in the diagnosis and treatment of patients with Cushing syndrome. Corticotropin-dependent and corticotropin-independent causes of Cushing syndrome can be separated by measuring plasma corticotropin. Plasma free cortisol measurements should be obtained only to determine the success or failure of transsphenoidal microadenomectomy or adrenalectomy. Inferior petrosal sinus sampling is used to confirm the source of corticotropin secretion before surgical intervention.

A 50-year-old female sees you for follow-up of her hypertension. At her last visit 4 weeks ago you started her on lisinopril (Prinivil, Zestril), 10 mg daily, because of a blood pressure of 158/92 mm Hg and confirmed hypertension on ambulatory blood pressure monitoring. She is tolerating the medication well and has no side effects. She does not take any other medications. Today her blood pressure is 149/90 mm Hg, which you confirm on repeat measurement. This is also consistent with her home measurements. At her last visit a basic metabolic panel was normal. You repeat a basic metabolic panel today and the results are normal except for a BUN of 25 mg/dL (N 8–23) and a creatinine level of 1.5 mg/dL (N 0.6–1.1). At her last visit her BUN was 12 mg/dL and her creatinine level was 0.7 mg/dL. Which one of the following would be most appropriate at this time?

A. Continue her current treatment regimen.
B. Increase lisinopril to 20 mg daily.
C. Continue lisinopril at the current dosage and add amlodipine (Norvasc), 5 mg daily.
D. Discontinue lisinopril and begin amlodipine, 5 mg daily.
E. Discontinue lisinopril and begin losartan (Cozaar), 25 mg daily.

Answer: D.

This patient has essential hypertension and her goal blood pressure is <140/90 mm Hg based on JNC 8 guidelines, or 130/80 mm Hg based on the more recent recommendations of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Until recently, it was recommended that physicians should tolerate a rise of <30% in serum creatinine after ACE inhibitor or angiotensin receptor blocker (ARB) initiation. Rises in serum creatinine of >30% from baseline increase the risk of renal failure, adverse cardiac outcomes, and death. A recent study suggests that rises in serum creatinine of <30% also put patients at risk for these outcomes, with a dose-response relationship between the magnitude of creatinine change and the risk of adverse outcomes. This patient has more than a 30% rise in creatinine and has no other factors, such as diabetes mellitus, heart failure, or chronic kidney disease, that would indicate a need for ACE or ARB therapy for her hypertension. Discontinuing her ACE inhibitor and starting a medication from a different class is the most appropriate treatment at this time. Based on JNC 8 guidelines, additional options for blood pressure medications include thiazide diuretics and calcium channel blockers.

A 14-year-old female is brought to your office for an annual well child check and sports preparticipation physical examination. She says she does a lot of running during basketball practices and games but has trouble controlling her weight. Most of her family is overweight. She does not have any difficulty participating in sports, and has no symptoms such as chest pain, shortness of breath, or headaches. She has no significant past medical history. On examination the patient's height is 154 cm (61 in) and she weighs 63 kg (139 lb). Her BMI is 26.4 kg/m2, which places her in the 90th percentile for her age. Her blood pressure is 130/85 mm Hg, which places her between the 95th and 99th percentile for her age, height, and sex. Her chart reveals that her blood pressure was at this level at the last two visits. The physical examination is otherwise normal. In addition to counseling and support for weight loss, which one of the following would be most appropriate at this point?

A. Informing the patient and her parents that she is prehypertensive and having her return for a blood pressure check in 3 months.
B. Plasma renin and catecholamine levels.
C. An imaging study of the renal arteries.
D. A fasting basic metabolic panel, a lipid profile, and a urinalysis.
E. Antihypertensive drug therapy.

Answer: D.

In a pediatric patient, blood pressure should be evaluated using comparisons based on age, sex, and height.

Although this adolescent’s blood pressure is prehypertensive for an adult according to JNC 8 guidelines, it is stage 1 hypertension (between 95% and 99%) for her age, sex, and height. All pediatric patients with confirmed hypertension should have further evaluation to check for renal dysfunction as well as other cardiac risk factors. Additionally, renal ultrasonography is recommended to evaluate for renal disease and echocardiography to evaluate for end-organ damage that would affect treatment goals. Additional studies, such as plasma renin and catecholamine levels or renovascular imaging, may be indicated in children with abnormalities on initial evaluation that suggest secondary causes of hypertension. Pharmacologic therapy is usually recommended for pediatric patients with symptomatic hypertension, secondary hypertension, target organ damage, diabetes mellitus, or persistent hypertension in spite of nonpharmacologic treatment. A low-sodium diet may be helpful for decreasing blood pressure, and given this patient’s obesity, intensive counseling about lifestyle changes is appropriate.

KFMC Mid-Year 2022

Blood pressure 132/85 is which category according to SHMS:

A. Normal BP.
B. Prehypertension.
C. Hypertension stage 1.
D. Hypertension stage 2.

Answer: B.

KSMC Midyear 2022

A 58-year-old man with a 15-year history of hypertension. Medical history is significant for hypertensive nephropathy. Medications are Lisinopril and hydrochlorothiazide. On physical examination, the patient afebrile, blood pressure is 138/82 mm Hg, pulse rate is 83/min and respiration rate is 12/min. BMI is 29. Other physical examination normal. Laboratory studies show serum creatinine level of 1.7 mg/dL (150.3µmol/L) and a urine albumin-creatinine ratio of 200 mg/g. Which of the following is the most appropriate management?

A. Replace Lisinopril with amlodipine.
B. Add losartan.
C. Continue current medications.
D. Increase Lisinopril dose.

Answer: C?

A 70-year-old woman complains of recurrent palpitations, dizziness, and blurred vision after prolonged standing. Her medical conditions include hypertension and dyslipidemia. Her current medications include hydrochlorothiazide, amlodipine, and rosuvastatin. Which one of the following evaluations is the best next step to reveal the cause of her condition?

A. Vitamin B12 level.
B. Blood urea nitrogen and creatinine.
C. Complete blood count.
D. Supine and standing blood pressure measurement.

Answer: D?

KFMC Mid-Year 2021

Which one of the following antihypertensive medications is associated with reduced progression of diabetic kidney disease?

A. Labetalol.
B. Amlodipine.
C. Valsartan.
D. Chlorthalidone.

Answer: C.

ACE inhibitors and angiotensin receptor blockers are associated with decreased progression of diabetic kidney disease. Unless otherwise contraindicated, patients with diabetes should be taking one of these agents. Amlodipine, chlorthalidone and labetalol, are not directly associated with decreased progression of diabetic kidney disease, but they all may contribute to a decrease in progression due to long-term control of blood pressure.

According to the most recent American College of Cardiology/American Heart Association guidelines, hypertension is defined as a blood pressure reading greater than?

A. 140/90 mm Hg.
B. 135/85 mm Hg.
C. 120/80 mm Hg.
D. 130/80 mm Hg.

Answer: D.

The latest American College of Cardiology/American Heart Association guidelines promote a radical change in the management of hypertension, which they now define as a blood pressure 130/80 mm Hg. Elevated blood pressure is defined as a systolic pressure of 120–129 mm Hg and a diastolic pressure <80 mm Hg. A blood pressure of 130–139/80–89 mm Hg is classified as stage 1 hypertension and a systolic pressure 140 mm Hg or a diastolic pressure 90 mm Hg is classified as stage 2 hypertension.

A 42-year-old male with hypertension and hyperlipidemia sees you for a routine health maintenance examination. His blood pressure is 185/105 mm Hg. He does not have any current symptoms, including headache, chest pain, edema, or shortness of breath. He is adherent to his current medication regimen, which includes lisinopril 10 mg daily, and simvastatin 20 mg at night. A thorough history and physical examination are both unremarkable. Which one of the following would be the most appropriate next step?

A. Increase lisinopril to 20 mg.
B. A comprehensive metabolic panel, fasting lipid profile, and TSH level.
C. A stress test.
D. A 30-minute rest period followed by a repeat blood pressure reading.

Answer: D.

The first step in the management of severe hypertension is determining whether a hypertensive emergency is present. A thorough history and physical examination are crucial (SOR C). Severe hypertension (blood pressure >180 mm Hg systolic or >110 mm Hg diastolic) with end-organ damage constitutes a hypertensive emergency. A physical examination should center on evaluating for papilledema, neurologic deficits, respiratory compromise, and chest pain. If end-organ damage is present the patient should be hospitalized for monitored blood pressure reduction and further diagnostic workup. If end- organ damage is not present and the physical examination is otherwise normal, a 30-minute rest with reevaluation is indicated. Approximately 30% of patients will improve to an acceptable blood pressure without treatment (SOR C). Home medications should then be adjusted with outpatient follow-up and home blood pressure monitoring (SOR A). Short- acting antihypertensives are indicated if mild symptoms are noted such as headache, lightheadedness, nausea, shortness of breath, palpitations, anxiety, or epistaxis. Diagnostic testing is not immediately indicated for asymptomatic patients (SOR C). A basic metabolic panel or other testing should be considered if mild symptoms are present. Aggressive lowering of blood pressure can be detrimental and a gradual reduction over days to weeks) is preferred (SOR C).

A 50-year-old Asian female known case of DM, newly diagnosed HTN 160/95, what is your management?

A. Hydrochlorothiazide/Lisinopril.
B. Amlodipine 5 mg.
C. ACEi.
D. Hydrochlorothiazide TID.

Answer: A.

According to ACC/AHA guideline, this patient has stage 2 hypertension. For stage 2 HTN 2 Antihypertension medications either Thiazide diuretic + ACE inhibitor or angiotensin-II receptor antagonist, or ACE inhibitor or angiotensin-II receptor antagonist + calcium-channel blocker. (BMJ Pest Practice).

An 85-year-old female presents to your office to establish care. She has a history of essential hypertension, bilateral osteoarthritis of the knees, depression, and hypothyroidism. The patient feels well and has only mild pain from her osteoarthritis. A recent basic metabolic panel showed a sodium level of 132 mEq/L (N 135–145) but was otherwise unremarkable. A TSH level was 1.07 U/mL (N 0.45– 4.50). Which one of the medications in this patient's current regimen is most likely causing the hyponatremia?

A. Acetaminophen.
B. Hydrochlorothiazide.
C. ACEI.
D. Levothyroxine.

Answer: B.
Hyponatremia is an extremely common condition, affecting 4%–7% of the ambulatory population. While a number of medications can cause hyponatremia, among the most common offenders are SSRIs and thiazide diuretics. Acetaminophen and metoprolol are not known to affect sodium levels. Vitamin D deficiency has also been linked to hyponatremia so supplementation would likely improve rather than worsen hyponatremia.

The nurse called you for a patient who has high BP reading 190/110, he has no symptoms other than mild headache. What is your next step?

A. Captopril.
B. Rest for 30 min and then repeat the BP reading, if still high decrease gradually.
C. Send the patent home.

Answer: B.
The first step in the management of severe hypertension is determining whether a hypertensive emergency is present. A thorough history and physical examination are crucial (SOR C). Severe hypertension (blood pressure >180 mm Hg systolic or >110 mm Hg diastolic) with end-organ damage constitutes a hypertensive emergency. A physical examination should center on evaluating for papilledema, neurologic deficits, respiratory compromise, and chest pain. If end-organ damage is present the patient should be hospitalized for monitored blood pressure reduction and further diagnostic workup. If end- organ damage is not present and the physical examination is otherwise normal, a 30-minute rest with reevaluation is indicated. Approximately 30% of patients will improve to an acceptable blood pressure without treatment (SOR C). Home medications should then be adjusted with outpatient follow-up and home blood pressure monitoring (SOR A). Short- acting antihypertensives are indicated if mild symptoms are noted such as headache, lightheadedness, nausea, shortness of breath, palpitations, anxiety, or epistaxis. Diagnostic testing is not immediately indicated for asymptomatic patients (SOR C).

KFMC Mid-Year 2020

A 60 years old male with (HgbA1c = 5.6%) and high blood pressure reading in last clinic visit. Today and after 3 months of diet and exercise his average BP reading: (146/92), what to do next?

A. Continue lifestyle modification and follow up after 1 month.
B. Start Dual therapy (valsartan + thiazide).
C. Start Amlodipine 5 mg OD.
D. Start Beta-blocker.

Answer: C.

According to ACC/AHA, this patient has stage 2 Hypertension and therefore requires BP-lowering medication. If the goal is not met after 1 month with assessment and adherence, then dual therapy can be considered.

Central Region Mid-Year 2019

A 70-year-old male, presents to your clinic for hypertension follow-up. He was started on 20 mg daily, 1 month ago. Laboratory tests from his last visit, including a CBC and a complete metabolic panel, were normal except for a serum creatinine level of 1.5 mg/dL (N 0.6-1.5). A follow-up renal panel obtained yesterday shows a creatinine level of 3.2 mg/dL (N 0.6-1.5) and a BUN of 34 mg/dL (N 8-25). Which one of the following is the most likely cause of this patient's increased creatinine level?

A. Bilateral renal artery stenosis.
B. Coarctation of the aorta.
C. Essential hypertension.
D. Hyperaldosteronism.

Answer: A.

A 45-year-old female patient with hypertension on hydrochlorothiazide, came to your clinic with history of pain of the foot. On evaluation, the patient is moderately obese. She rates her pain as moderate to severe. She is unable to put pressure on her right foot. Which of these is the most likely preliminary diagnosis?

A. Rheumatoid arthritis.
B. Osteodystrophy.
C. Osteoarthritis.
D. Acute gout.

Answer: D.

SFH Mid-Year 2019

Which one of the following medication changes is most appropriate for a 52-year-old man with an average Home Blood Pressure of 160/100 mmHg despite treatment with hydrochlorothiazide 25 mg daily whose previous evaluation revealed no secondary causes of hypertension and no comorbidities?

A. Replace hydrochlorothiazide with furosemide 20 mg daily.
B. Add Amlodipine.
C. Add spironolactone.
D. Add atenolol.

Answer: B.

A 62-year old man with a history of Coronary Artery Disease and Hypertension returns for a BP check. His current BP is 156/82 mm Hg. Several weeks ago, he started taking hydrochlorothiazide as a dose of 25 mg daily. His other medications are Aspirin 81 mg daily, Carvidalol 25 mg twice daily, and simvastatin 40 mg daily. His Renal Function and Potassium levels have been normal. Which one of the following antihypertensive drugs can be added safely and effectively to this patient's current medication regimen?

A. Amlodipine.
B. Verapamil.
C. Ramipril.
D. Diltiazem.

Answer: C.

48-year old healthy male presents to the FMC for routine periodic health assessment. At the office three BP readings 5 minutes apart revealed:

BP1: 138/88 mmHg. BP2: 139/80 mmHg. BP3: 139/80mmHg.

His medical record showed no previous visit or investigations. Which of the followings is the most appropriate next action at this stage?

A. Calculate the ASCVD risk using the Pool Cohort Equation (PCE).
B. Initiate low dose Thiazide and provide three weeks appointment for reassessment.
C. Assess him for secondary hypertension, to rule out renal and endocrinologic underlying cause.
D. Order basic metabolic and lipid profile, ECG, Urinalysis with life style advice and appointment within two weeks.

Answer: D.

You are following a patient with hypertension and diabetes in your office. Despite good blood pressure and glycemic control. his GFR has started to decrease. GFR measurement was 74 mL/minute 3 months ago. At this visit GFR is 55mL/minute-Creatinine is within normal limits, and his serum potassium is 5.2 mmol/L (normal is up to 5.1mmol/L). The patient denies any changes in urination or other problems. Which of the following is most appropriate at this stage?

A. See the patient more frequently at least monthly.
B. Increase his ACE inhibitor.
C. Add diuretic therapy .
D. Refer to a nephrologist.

Answer: D.

You are caring for a 45-year-old man with hypertension, gastroesophageal reflux and depression. His medication list includes Hydrochlorothiazide, Verapamil, Terazosin, Omeprazole, Bupropion, and Trazodone. He is complaining of ejaculatory dysfunction. Which of the medications is most likely to cause this problem?

A. Hydrochlorothiazide.
B. Verapamil.
C. Terazosin.
D. Bupropion.

Answer: C.

A 70-year-old male with a past medical history significant for long-standing diabetes mellitus and hypertension presents with a stroke. CT of the head shows mild atrophy, with no acute bleeding. In the first 24 hours after his stroke, starting treatment to control his blood pressure is recommended if it reaches what threshold level?

A. 150/90 mm Hg.
B. 160/100 mm Hg.
C. 200/110 mm Hg.
D. 220/120 mm Hg.

Answer: D.

A 50-year-old man presents for follow-up after hospitalization for an acute myocardial infarction. His blood pressure is 145/92 mm Hg. Which one of the following classes of antihypertensives is considered first-line therapy in this situation?

A. Thiazide diuretics.
B. Loop diuretics.
C. Beta blockers.
D. Calcium channel blockers.

Answer: C.

Which of the following statements about severe asymptomatic hypertension is false?

A. Patients typically have had hypertension for months or years before they present to the emergency department or physician's office.
B. Rapid reduction in blood pressure may be harmful.
C. Some patients have evidence of end-organ damage.
D. Severe asymptomatic hypertension can be classified as hypertensive urgency or severe uncontrolled hypertension.

Answer: C.

Which of the following statements about diagnostic testing in patients with severe asymptomatic hypertension are correct?

A. Any patient with headache should be evaluated with computed tomography or magnetic resonance imaging.
B. Evaluation of hemoglobin levels is recommended for all patients.
C. Electrocardiography is not recommended in patients with signs or symptoms of cardiovascular disease.
D. An estimate of glomerular filtration rate is helpful in assessing cardiovascular risk.

Answer: D.

In addition to lifestyle, such as weight loss and a low-sodium diet, which one of the following approaches is most appropriate to slow the progression of Chronic Kidney Disease in a 57-year-old woman who takes chlorthalidone 12.5 mg daily for hypertension metformin 1000 mg twice daily for T2DM-and currently has a BP of 151/92 mmHg, a glycated hemoglobin level of 6.5% (reference range, 3.8 5.6), a serum bicarbonate level of 22mEq/L (21 – 30mEq/L), and a urine albumin to creatinine ratio of 324 mg/g(<30 mg/g)?

A. Increase chlorthalidone to 25 mg daily.
B. Add lisinopril 10 mg daily.
C. Add furosemide 20 mg daily.
D. Decrease metformin to 500 mg twice daily.

Answer: B.

AlHsa Mid-Year 2019

According to the members of the Eighth Joint National Committee (JNC 8), the blood pressure goal in a patient with diabetes and CKD is?

A. <100/50 mm Hg.

B. <110/70 mm Hg.
C. <130/80 mm Hg.
D. <140/90 mm Hg.

Answer: D.

Part 1 2022

A 56-year-old woman with a long history of untreated hypertension is brought to the ER because of severe headache and confusion. The patient is oriented to person, but not to time or place. Her blood pressure is 230/140 mm Hg, pulse is 86/min, and RR is 18/min. Funduscopic examination reveals optic disk edema, and a dipstick test shows protein in the urine. Which of the following is the most appropriate pharmacotherapy?

A. Lisinopril.
B. Clonidine.
C. Esmolol.
D. Na Nitroprusside.

Answer: D.

The patient is exhibiting the clinical picture of hypertensive emergency, in which striking elevation of blood pressure (diastolic values often > 130 mm Hg) is associated with signs and symptoms of both cerebral damage (headache, confusion, and optic disk edema) and renal damage (proteinuria). Aggressive management is required to avoid serious complications or death and is aimed at gradually lowering blood pressure within 1 hour. IV infusion of sodium nitroprusside is the treatment of choice, but its administration should be carefully titrated to obtain the desired effect without excessively rapid reduction in blood pressure. Clonidine is an oral antihypertensive agent that should be reserved for less severe cases of hypertension (so-called hypertensive urgencies), in which signs of cerebral or renal damage are not detectable. Esmolol is a beta blocker drug that has been useful in treating hypertensive emergencies in the presence of myocardial ischemia. However, it should be combined with some other antihypertensive agent. Furosemide as well as other IV loop diuretics may be useful in the presence of signs of cardiac failure or fluid retention, but their action is slow to manifest. Hydralazine is mainly used in hypertensive crises affecting children and pregnant women. It may induce dangerous reflux tachycardia.

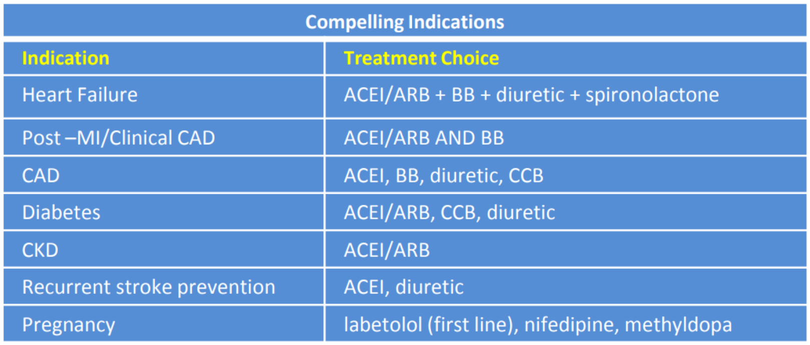
Part 1 2021

Patient has diabetes, ischemic stroke, and asthma. What is the best antihypertensive treatment?

A. Hydrochlorothiazide + Lisinopril.
B. Lisinopril + Atenolol.
C. CCB + Thiazides.
D. Diltiazem + Atenolol.

Answer: A.

Lisinopril + Atenolol, are beta blockers + ACEi is the best option for those with stroke also beta blocker like Carvedilol is one which decrease mortality. (Braton).



Compelling Indications	
Indication	**Treatment Choice**
Heart Failure	ACEI/ARB + BB + diuretic + spironolactone
Post –MI/Clinical CAD	ACEI/ARB AND BB
CAD	ACEI, BB, diuretic, CCB
Diabetes	ACEI/ARB, CCB, diuretic
CKD	ACEI/ARB
Recurrent stroke prevention	ACEI, diuretic
Pregnancy	labetolol (first line), nifedipine, methyldopa

Patient complaining of headache, blurry vision, and chest pain. His blood pressure is 210/110 mm Hg. What is your management?

A. Ramipril.
B. Methyldopa.
C. Clevidipine.
D. Valsartan.

Answer: C.

Ramipril, not for the setting of urgent HTN nor for end organ damage. Methyldopa, in pregnancy and not for urgent hypertension. Valsartan, same Ramipril.

Part 1 2019

In a patient presenting with truncal obesity, hypertension, type 2 diabetes mellitus, hirsutism, osteopenia, and skin fragility, which one of the following tests is needed to confirm the diagnosis?

A. A dexamethasone suppression test.
B. Aldosterone ratio.
C. ACTH.
D. Urinary free cortisol

Answer: D.

Part 1 2016 - 2006

Patient with DM, severe HTN with AF. Presented with sudden onset of pig toe pain. His BP 195/110 mmHg. What is the treatment?

A. Propranolol + ACE Inhibitor.
B. Propranolol + Lasix.
C. Verapamil + Hydrochlorothiazide.

Answer: A.

Thiazide and loop diuretics are independent risk factors for incident and likely recurrent gout. However, if blood pressure control can be effectively and affordably achieved with an appropriate alternative agent, such as an angiotensin inhibitor or a dihydropyridine calcium channel blocker, then the diuretic can be stopped. Among patients with hypertension, the concurrent administration of an angiotensin-converting enzyme (ACE) inhibitor or an angiotensin II receptor blocker (ARB) can minimize the diuretic-induced rise in plasma urate concentration. This has been thought to be mediated by reversal of the stimulatory effect of angiotensin II on proximal sodium and urate reabsorption.

Pregnant lady at the 16 weeks of gestation. Her BP 149/95mm Hg, urine protein 0.7 g/dl. What is the diagnosis?

A. Preeclampsia.
B. GIH.
C. Essential HTN.
D. Normal.
E. 2ry HTN.

Answer: C.

Chronic hypertension is defined as a blood pressure measurement of 140/90 mm Hg or more on two occasions before 20 weeks of gestation or persisting beyond 12 weeks postpartum. Gestational hypertension has replaced the term pregnancy-induced hypertension to describe women who develop hypertension without proteinuria after 20 weeks of gestation. Preeclampsia is a multiorgan disease process of unknown etiology characterized by the development of hypertension and proteinuria after 20 weeks of gestation. Eclampsia, an eclamptic seizure may be preceded by increasingly severe preeclampsia, or it may appear unexpectedly in a patient with minimally elevated blood pressure and no proteinuria. AAFP.

Diabetic, and hypertensive patient, his cholesterol level is 5.2, BP 148/92mm Hg, on Metformin, HCT, and Aspirin. What will you give him?

A. ACE inhibitor.
B. Sulfonylurea.
C. Simvastatin.

Answer: A.

Angiotensin-converting enzyme inhibitors are considered first-line therapy in patients with diabetes and hypertension because of their well-established renal protective effects.

A 40-years old woman patient complaining of episodic irregular heart beat associated with sweating, diaphoresis, palpitation and feeling apprehension. Physical examination reveals a thin woman with a BP 190/140 and pulse 114 beats/min. What will you find in her urine analysis?

A. DHEAS.
B. 17α-hydroxyprogesterone.
C. Vanillylmandelic acid (VMA).
D. 5-hydroxyindoleacetic acid (5-HIAA).

Answer: C.

Pheochromocytoma: Paroxysmal hypertension, headaches diaphoresis, palpitations, tachycardia. Diagnostic study: Urinary catecholamine metabolites (vanillylmandelic acid, metanephrines, normetanephrines) Plasma free metanephrines (AAFP 2003).

A 58-year-old male patient, complaining of right eye pain. On fundoscopy, there is dot plot spot and cotton wall hemorrhage. You note also edema of optic disc. Finding most commonly associated with?

A. DM retinopathy.
B. Hypertensive retinopathy.
C. Retinal detachment.

Answer: B.

- Mild-Retinal arteriolar narrowing related to vasospasm, arteriolar wall thickening or opacification, and arteriovenous nicking, referred to as nipping.
- Moderate-Hemorrhages, either flame or dot-shaped, cotton-wool spots, hard exudates, and microaneurysms.
- Severe- Some or all of the above, plus optic disc edema.
- The presence of papilledema mandates rapid lowering of the blood pressure. UpToDate.

What is the best anti hypertension medication with benign prostatic hypertrophy?

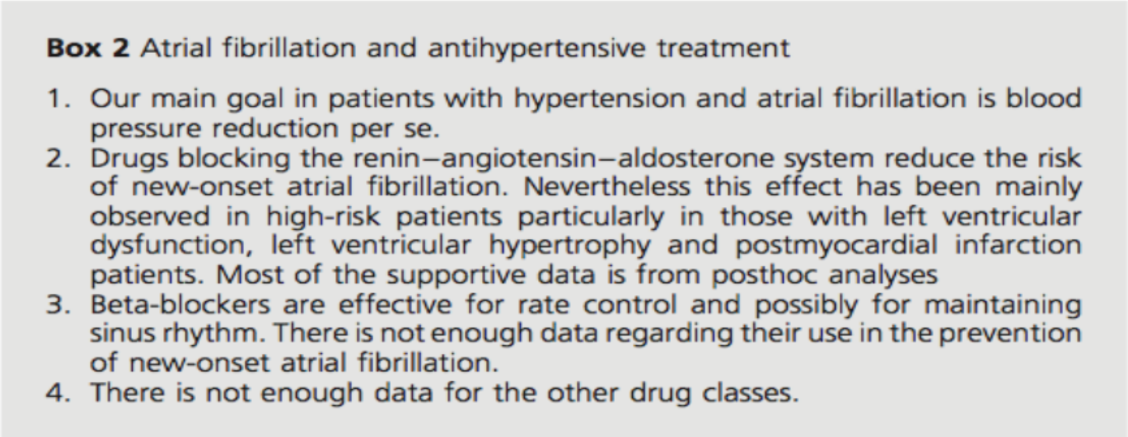
A. β-adrenergic blocker.
B. ACE inhibitor.
C. Calcium-channel blocker.
D. α-adrenergic blocker.

Answer: D.

A 70-year-old male patient with severe hypertension and history of palpitation, presented with acute onset big toe pain. BP 195/110 mm Hg. On examination, there is atrial fibrillation. Hat is the appropriate treatment?

A. Propranolol and ACE.
B. Propranolol and Furosemide.
C. Propranolol and Hydrochlorothiazide.
D. Verapamil and Furosemide.
E. Verapamil and Hydrochlorothiazide.

Answer: A.
Patient presented with acute onset big toe pain, i.e. suggest gout so hydrochlorothiazide is not a good choice since one of its side effect is gout. From Medscape: Regardless of the long-term management strategy chosen, control of ventricular rate is a critical component of management of new-onset AF. Beta-blockers and calcium channel blockers are first-line agents for rate control in AF. These drugs can be administered either intravenously or orally. They are effective at rest and with exertion. Intravenous diltiazem or metoprolol are commonly used for AF with a rapid ventricular response. Caution should be exercised in patients with reactive airway disease who are given beta-blockers. Digoxin can be used in the acute setting but does little to control the ventricular rate in active patients. As such, it is rarely used as monotherapy. Caution should be exercised in elderly patients and those with renal failure receiving digoxin. Digoxin is indicated in patients with heart failure and reduced left ventricular function. http://www.eshonline.org/esh-content/uploads/2015/02/posistion_esh_af_2012.pdf

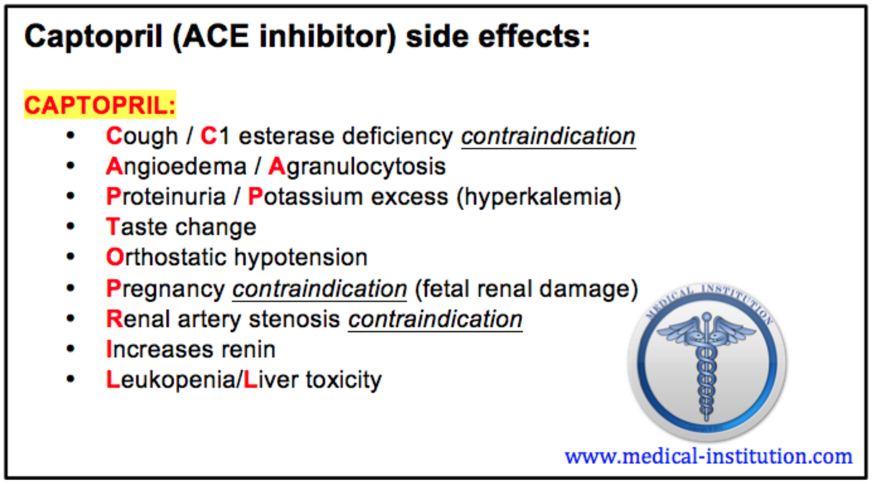


Box 2 Atrial fibrillation and antihypertensive treatment

1. Our main goal in patients with hypertension and atrial fibrillation is blood pressure reduction per se.
2. Drugs blocking the renin–angiotensin–aldosterone system reduce the risk of new-onset atrial fibrillation. Nevertheless this effect has been mainly observed in high-risk patients particularly in those with left ventricular dysfunction, left ventricular hypertrophy and postmyocardial infarction patients. Most of the supportive data is from posthoc analyses
3. Beta-blockers are effective for rate control and possibly for maintaining sinus rhythm. There is not enough data regarding their use in the prevention of new-onset atrial fibrillation.
4. There is not enough data for the other drug classes.

Hypertensive patient with muscle weakness and fatigue. He takes Lisinopril. What is the electrolyte abnormality?

A. Hyperkalemia.
B. Hypokalemia.
C. Hypernatremia.
D. Hyponatremia.



Captopril (ACE inhibitor) side effects:

CAPTOPRIL:

- **C**ough / **C**1 esterase deficiency *contraindication*
- **A**ngioedema / **A**granulocytosis
- **P**roteinuria / **P**otassium excess (hyperkalemia)
- **T**aste change
- **O**rthostatic hypotension
- **P**regnancy *contraindication* (fetal renal damage)
- **R**enal artery stenosis *contraindication*
- **I**ncreases renin
- **L**eukopenia/**L**iver toxicity

www.medical-institution.com

Answer: A.

What is the main concern in using antihypertensive in the elderly?

A. Hypotension >>> (orthostatic).
B. Hypokalemia.
C. Hyperkalemia.
D. Heart failure.

Answer: A.

Orthostatic hypotension is a common concern with older adults receiving antihypertensives and has been defined as a systolic BP decrease of 20 mmHg or more, or a diastolic BP decrease of 10 mmHg or more within 3 min of assuming an erect posture. Treatment should be initiated with a low dose of the chosen antihypertensive agent and titrated slowly to minimize side effects such as orthostatic hypotension. Sitting and standing BP can be monitored, particularly when multiple antihypertensives are used, to check for orthostatic hypotension, which may increase risk of falls and fractures. Some of the most common side effects associated with antihypertensive use in older adults with CKD include hyperkalemia, AKI, and orthostatic hypotension. Source AAFP.

One of your patients is known case of DM II, his BP is high 150/95 mm Hg. What is the best management?

A. ACEI.
B. Thiazide.
C. Combination ACEI + thiazide.
D. DASH for 3 months.

Answer: A.

ADA recommendation; in patients with type 1 diabetes, with or without hypertension, with any degree of albuminuria, ACE inhibitors have been shown to delay the progression of nephropathy. In patients with type 2 diabetes, hypertension and microalbuminuria, ACE inhibitors and ARBs have been shown to delay the progression to macro-albuminuria.

Which of the following can cause isolated systolic hypertension?

A. Thyrotoxicosis.
B. Aortic regurgitation.
C. Decrease elasticity of blood vessels.

Answer: ?.

The cause is the loss of elasticity of the arteries that occurs with aging. Other causes in young include thyrotoxicosis, arteriovenous fistulas, or aortic regurgitation.

Case of newly diagnosed hypertensive male, BP 160/110, what will you give?

A. Aspirin.
B. Enalapril + Propranolol.
C. Amlodipine + Indapamide.
D. Valsartan.

Answer: C.

For stage 2 HTN 2 Antihypertension medications either Thiazide diuretic + ACE inhibitor or angiotensin-II receptor antagonist, or ACE inhibitor or angiotensin-II receptor antagonist + calcium-channel blocker. BMJ Pest Practice.

Hypertension patient present complaining of weakness and fatigue. Laboratory investigation showed, Na: low, K: low. What antihypertensive medication can cause this?

A. Captopril.
B. Thiazide.
C. Amlodipine.

Answer: B.

A 60-year-old male, smoker and has hypertension. He is asymptomatic. On examination, you found around the umbilicus a pulsatile mass. What is the best investigation?

A. MRI.

B. US.

Answer: B.

Promotion 2022

60 years old man comes to the office complaining of difficulty hearing for the past few weeks. His past medical history is significant for coronary artery disease, type 2 diabetes mellitus, hypertension, congestive heart failure and stage 2 chronic renal failure. The patient was recently hospitalized for acute decompensated heart failure. His medication include low-dose Aspirin, diuretic, beta blocker and an angiotensin-converting enzyme inhibitor. Examination shows bilateral hearing loss. Which of the following medications is the most likely cause of this patient's hearing problem?

A. Aspirin.
B. Furosemide.
C. Hydrochlorothiazide.
D. Lisinopril.
E. Metoprolol.

Answer: B.

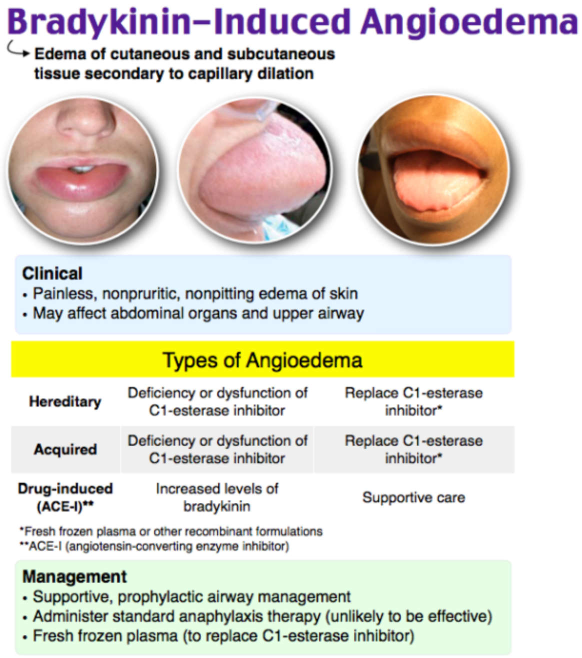
Promotion 2021

40-year-old man presents to your clinic with complaints of a "terrible head cold." He has a three-day history of low-grade fever, purulent nasal drainage, nasal obstruction, and facial pain. This morning he noticed that his lips look swollen. His past medical history is significant for hypertension that is controlled with an angiotensin converting enzyme inhibitor. Which of the following symptoms suggests the need for immediate further evaluation and supportive care?

A. Facial pain.
B. Nasal obstruction.
C. Purulent nasal drainage.
D. Swollen lips.

Answer: D.

Angiotensin-converting enzyme (ACE) inhibitors are the leading cause of drug-induced angioedema. Patients most commonly present with swelling of the lips, tongue, or face. Visceral edema presenting as acute abdominal pain is also possible. Urticaria and itching are absent. Symptoms typically begin during the first week of treatment, although some cases develop after years of uneventful therapy. The primary acute treatment of ACE inhibitor-induced angioedema is supportive care until the angioedema resolves.



Bradykinin–Induced Angioedema

↳ Edema of cutaneous and subcutaneous tissue secondary to capillary dilation

Clinical
- Painless, nonpruritic, nonpitting edema of skin
- May affect abdominal organs and upper airway

Types of Angioedema

Hereditary	Deficiency or dysfunction of C1-esterase inhibitor	Replace C1-esterase inhibitor*
Acquired	Deficiency or dysfunction of C1-esterase inhibitor	Replace C1-esterase inhibitor*
Drug-induced (ACE-I)**	Increased levels of bradykinin	Supportive care

*Fresh frozen plasma or other recombinant formulations

**ACE-I (angiotensin-converting enzyme inhibitor)

Management
- Supportive, prophylactic airway management
- Administer standard anaphylaxis therapy (unlikely to be effective)
- Fresh frozen plasma (to replace C1-esterase inhibitor)

What molecule is responsible for causing the clinical features of ACE inhibitor-induced angioedema?

Answer: Elevated levels of bradykinin, an inflammatory vasoactive peptide, leads to vasodilation of blood vessels.

Angioedema
- Patient will be complaining of swelling of the tongue, face, and neck in the absence of hives.
- Most commonly caused by:
  - Idiopathic.
  - Drug-induced: ACE inhibitors (most common).
  - Hereditary: C1 esterase inhibitor deficiency.
- Treatment is airway management.
  - Hereditary: C1 esterase inhibitor replacement or FFP.

Promotion 2019

Hypertensive patient and Pre-diabetic, urine dipstick showed +Protein. Which one will decrease the risk of DM?

A. ACEI.
B. CCB.
C. Thiazide.

Answer: A.

Promotion 2018

Patient came complaining of chest pain, headache, and blurred vision. On examination, BP: 220/100 mm Hg. Pulse: 110 beat/min. Fundoscopic examination shows: papilledema + hemorrhage. (Emergency Hypertension). What is your management?

A. Nifedipine.
B. Enalapril.
C. Losartan.
D. Methyldopa.

Answer: ?A.

Female patient complaining of increased weight, hypertension, hirsutism, high blood sugar, and proximal muscle weakness. What is the diagnosis?

A. Cushing.
B. Hypothyroidism.

Answer: A.

Promotion 2015

Hypertensive patient, presented with headache and confusion. His BP of 210/110 mm Hg. What is the diagnosis?

A. Hpertensive emergency.
B. Hpertensive urgency.
C. Chronic hypertension.

Answer: A.

Hypertensive patient on hydrochlorothiazide and Beta-Blockers, presented with high creatinine level. What medication you will add to preserve his renal function?

A. ACEI.

Answer: A.

A 55-year-old man with HTN. According to JNC 8 what is the best antihypertensive medication for him?

A. Metoprolol.
B. Furosemide.
C. Amlodipine.
D. Clonidine.

Answer: C.

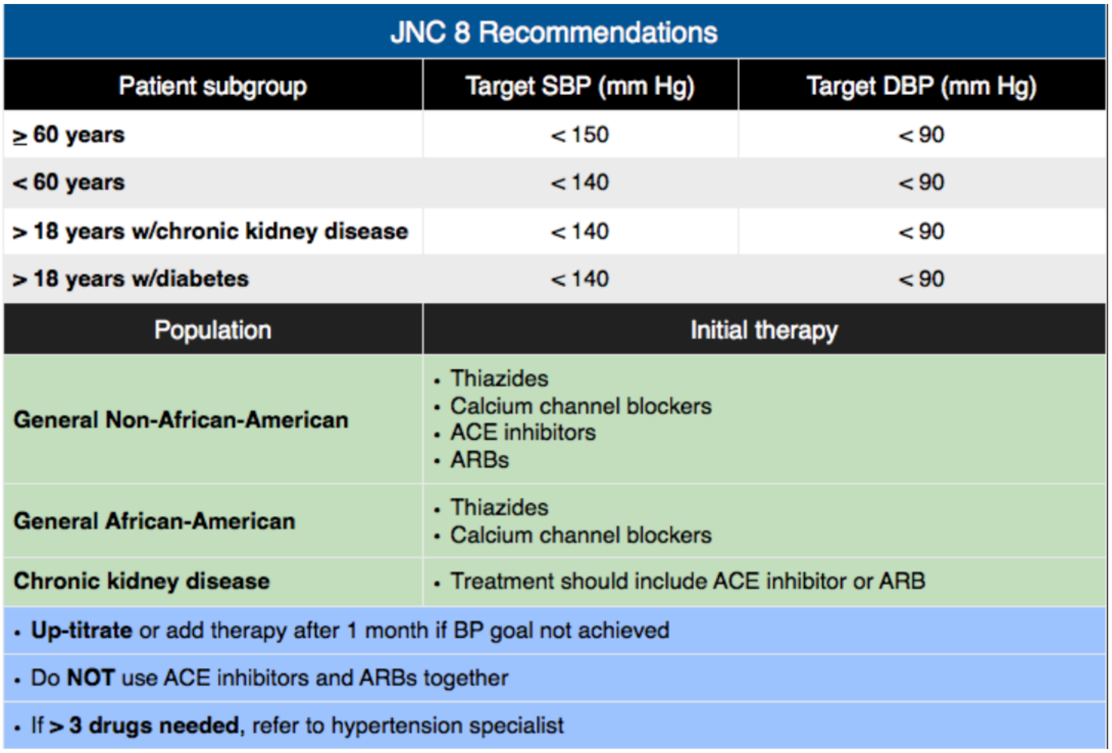
Rosh

A 38-year-old African American woman presents to the emergency department after checking her blood pressure at home and noticing it was "very high". She took her blood pressure last week at the drug store and noted it was elevated then as well. She does not have a primary care provider, does not have any significant past medical problems, and denies taking any medications. She denies confusion, change in vision, chest pain, dyspnea, neurologic deficits, or changes in urine output. Her vital signs are remarkable for a BP of 168/100 mm Hg. Physical examination is unremarkable. ECG shows normal sinus rhythm and the patient's metabolic panel shows a creatinine of 0.7 mg/dL. What is the most appropriate next step in the management of this patient?

A. Administer hydralazine and observation in ED.
B. Admit, obtain a complete blood count, troponin I, and lower BP with intravenous nicardipine.
C. No further workup; discharge home on amlodipine.
D. No further workup; discharge home on lisinopril

Answer: C.

Hypertension is the most common cardiovascular disease in the U.S. Hypertension is divided into primary and secondary hypertension. Primary is the most common and the etiology is idiopathic with multiple factors likely playing a role such as family history, smoking history, age, obesity, race, salt intake, and physical inactivity. Secondary hypertension can be caused by renal artery stenosis, renal disease, thyroid conditions, pheochromocytoma, obstructive sleep apnea, drugs, and several other causes. The diagnosis of hypertension is made by the definition put forward by the Joint National Committee (JNC). The JNC recommends when taking a blood pressure to have seated readings taken at least five minutes apart. In order to be diagnosed with hypertension, the readings need to be greater than 140/90 mm Hg in patients less than age 60 or for patients over the age of 60 with a history of diabetes mellitus. If patients are over the age of 60 and without diabetes, a reading greater than 150/90 mm Hg is required for diagnosis. Nearly 115 million annual ED visits are related to the treatment of hypertension. Asymptomatic hypertension is a common presenting complaint in the ED. Typically patients are sent in by their primary care provider, found to be hypertensive during an evaluation for an unrelated complaint, or present after having elevated blood pressures taken at home. The goal in the ED is to determine patients who have asymptomatic hypertension from those who have a hypertensive emergency, which is defined as end-organ dysfunction related to their hypertension. Clinical features of end-organ dysfunction are vision changes, confusion or altered mental status, dyspnea, chest pain, or oliguria. A creatinine level should be performed to ensure there is no end-organ kidney dysfunction. Otherwise, testing should be guided based on symptoms. For treatment, the JNC recommends with hypertension alone, in the absence of target organ damage, patients should begin oral antihypertensive therapy but rarely do they require emergency therapy or hospitalization. This African American woman is suffering from asymptomatic hypertension and based on current guidelines and her ethnicity, hypertension should be treated with either a calcium channel blocker or thiazide diuretic. Admit, obtain a complete blood count, troponin I, and lower BP with intravenous nicardipine (B) are steps for management of hypertensive emergencies. Hypertensive emergencies are defined as elevated blood pressure associated with target organ dysfunction. Aortic dissection, acute hypertensive pulmonary edema, acute kidney injury, hypertensive encephalopathy, subarachnoid hemorrhage, intracranial hemorrhage, and acute ischemic stroke are all examples of target organ dysfunction. Patients diagnosed with a hypertensive emergency should undergo further testing, be admitted, and have their blood pressure controlled with specific intravenous medications to specific parameters based on the type of hypertensive emergency. Administer hydralazine and observation in ED (A) is what would have previously been performed for a hypertensive urgency. Hypertensive urgency is a term that was previously used for patients with a blood pressure greater than 180/110 mm Hg who were asymptomatic. These patients were treated with rapid-acting oral or intravenous medications to lower their blood pressure. Patients would be observed, started on oral medications, then discharged home. Recently, the JNC changed their guidelines and due to the greater risk of harming patients than the benefit of treating patients, the recommendation is to no longer give rapid-acting oral or intravenous medications to acutely lower blood pressure. Rather, patients should be started on an oral antihypertensive medication with close follow-up. Discharge home on lisinopril (D) would be an appropriate treatment option if the patient was not African American. Based on the JNC recommendation, African Americans should be started on either a calcium channel blocker or a thiazide.



JNC 8 Recommendations

Patient subgroup	Target SBP (mm Hg)	Target DBP (mm Hg)
≥ 60 years	< 150	< 90
< 60 years	< 140	< 90
> 18 years w/chronic kidney disease	< 140	< 90
> 18 years w/diabetes	< 140	< 90

Population	Initial therapy
General Non-African-American	• Thiazides • Calcium channel blockers • ACE inhibitors • ARBs
General African-American	• Thiazides • Calcium channel blockers
Chronic kidney disease	• Treatment should include ACE inhibitor or ARB

- **Up-titrate** or add therapy after 1 month if BP goal not achieved
- Do **NOT** use ACE inhibitors and ARBs together
- If **> 3 drugs needed**, refer to hypertension specialist

Which intravenous medication should be started first for blood pressure control in a patient with an aortic dissection?

Answer: Esmolol or other intravenous beta-blocker.

JNC 8 Treatment for HTN

- BP goals:
    - o Age < 60 or Diabetic: 140/90
    - o Age > 60: 150/90
- Treatment:

- o #1 is always lifestyle modifications
- o Non-African-Americans: Thiazide, ACE inhibitor, or ARB or calcium channel blocker alone or in combination
- o African-Americans: Thiazide or calcium channel blocker alone or in combination
- o CKD (with or without diabetes): All races ACE inhibitor or ARB alone or in combination with other drug classes

A 56-year-old man presents to the emergency department complaining of hypertension. He was sent to the ED by his dentist for a blood pressure of 180/105 mm Hg in the office. He denies any chest pain, shortness of breath, headache, vision changes or change in urine output. He is compliant with amlodipine but has not seen his primary care physician in the last four months. His blood pressure is 180/100 mm Hg. What is the next step in management?

A. Admit to the hospital for hypertensive urgency.
B. Discharge home with instructions to follow up with primary care physician in three days.
C. Labetalol administered intravenously to normalize blood pressure to 140/90 mm Hg.
D. Prescribe clonidine orally and discharge home.

Answer: B.

Hypertension is a highly prevalent condition causing cardiovascular, renal, ophthalmic and neurologic morbidity and mortality, however less than 50% of those affected are undergoing appropriate pharmacologic treatment. Hypertensive emergencies occur when there is associated acute target organ injury with markedly elevated blood pressure. Hypertensive emergencies often warrant treatment of the elevated blood pressure. Hypertensive urgency is less severe, and defined as asymptomatic hypertension with systolic pressure greater than or equal to 180 mm Hg or diastolic pressure greater than 110 mm Hg. Recommendations are less clear for evaluation, treatment and follow-up of patients with hypertensive urgency. ACEP's clinical policy on the management of asymptomatic elevated blood pressure suggests that ED patients with asymptomatic markedly elevated blood pressure are not required to undergo routine screening for acute target organ injury (e.g., serum creatinine, urinalysis, ECG). In select populations with poor follow-up, a serum creatinine may identify kidney injury that may affect disposition. The clinical policy also states that routine ED medical intervention of asymptomatic markedly elevated blood pressure is not required. You may consider initiation of outpatient antihypertensive medication in those with poor follow-up. All patients should be referred for close follow-up. Therefore, discharge home with instructions to follow up with primary care physician in three days would be most appropriate for the clinical scenario above in a patient with an established primary care physician. Admit to the hospital for hypertensive urgency (A) would not be indicated in an asymptomatic patient with an established primary care physician. Labetalol administered intravenously to normalize blood pressure to 140/90 mm Hg (C) is not indicated. Rapidly lowering markedly elevated blood pressure in an asymptomatic patient has the potential to do harm. Prescribe clonidine orally and discharge home (D) is not indicated. Prescribing antihypertensives may be indicated if providing a refill or initiating medications in a patient with poor follow-up. Clonidine is not a first-line medication.

Asymptomatic Hypertension

- Most common causes of BP elevation: pain, anxiety.
- No workup usually indicated. ED may consider checking Cr.
- Outpatient follow-up.

Smoking cessation

Collected by: Nawaf Alghathber R2
Reviewed by: Faris AlOwain R2
Editing and final revision: Nuha Almasoud R3

Overview:

- It is sustained abstinence from tobacco for 6 months, but ideally for 1 year
- 70% of smokers tried at least once to stop smoking, 3-5% succeeded without help
- Average smokier attempting to quit five times before permanent success
- Smoking is the leading preventable cause of disease, disability and death.
- Relapse happens in the first 8 days from the quit date
- Nicotine withdrawal symptoms peak in the first three days of quitting, and subside over 3 weeks

Benefits of smoking cessation:

- Within 20 minutes: the heart rate and blood pressure drop.
- 12 hours: the CO level in the blood drops to normal
- 2-12 weeks: the circulation improves and lung function increases.
- 1-9 months: coughing and shortness of breath decrease.
- 1 year: 50% reduction of heart diseases.
- 5-15 years: clear reduction of stroke rate.
- 10 year: 50% reduction of lung cancer.
- 15 years: the risk of coronary heart disease is that of a nonsmoker.
- Women who quit smoking before pregnancy or in early pregnancy significantly reduce the risk of preterm birth, low birth weight, and infant mortality.

Screening:

- **Smoking:**
  recommends screening all adults by asking, and if so to encourage them to stop
- **Lung cancer:**
  annual screening with low-dose computed tomography (LDCT) in adults aged 50-80 who have a 20 pack-year smoking history and currently smoking or have quit within the past 15 years
- **Abdominal Aortic Aneurism:**
  it is recommended to do Ultrasound once in men aged 65-75 who have ever smoked

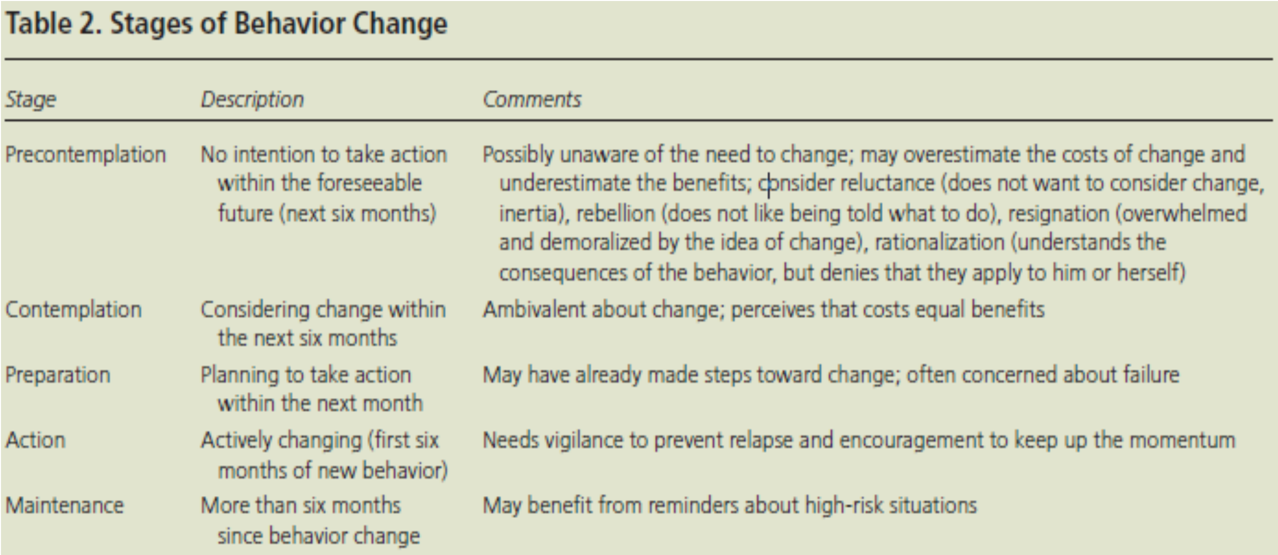


Table 2. Stages of Behavior Change

Stage	*Description*	*Comments*
Precontemplation	No intention to take action within the foreseeable future (next six months)	Possibly unaware of the need to change; may overestimate the costs of change and underestimate the benefits; consider reluctance (does not want to consider change, inertia), rebellion (does not like being told what to do), resignation (overwhelmed and demoralized by the idea of change), rationalization (understands the consequences of the behavior, but denies that they apply to him or herself)
Contemplation	Considering change within the next six months	Ambivalent about change; perceives that costs equal benefits
Preparation	Planning to take action within the next month	May have already made steps toward change; often concerned about failure
Action	Actively changing (first six months of new behavior)	Needs vigilance to prevent relapse and encouragement to keep up the momentum
Maintenance	More than six months since behavior change	May benefit from reminders about high-risk situations

Approach

Use the 5 As approach see table below

History: (important points in history)

Is the patient smoker? If not, did they quit recently?

- How many cigarettes per day?
- Do they smoke within the first 30 mins from waking up?

Have you ever tried to quit? If yes, what was the obstacles that led to relapse? Previous methods patient used to quit?

- Check other tobacco delivery products
- For women check pregnancy and breastfeeding
- Medical history (especially cardiac, asthma, neurological like seizures, and psychiatric disorders like depression)
- Social history (check environment, friends and possible causes of relapse, supportive groups like family, other illicit drugs like alcohol or IV drugs)

Approach	Description	Comments
Ask	- Smoking status should be documented at every visit. - Including smoking as a vital sign in patients' charts may remind the physician to address tobacco use.	- Have you ever smoked cigarettes or other tobacco products like cigars, pipes, smokeless tobacco, waterpipes/hookahs, and bidis) or electronic cigarettes? - If yes: determine frequency of use, products used, degree of nicotine dependence, history of quit attempts (including methods used and their effectiveness), and readiness to stop using tobacco at this time.
Advise	- There is clear evidence that brief (<five minutes) clinician advice to quit at each encounter can increase smoking abstinence rates.	- Discuss with the patient the benefits of quitting smoking - The advice should be clear, direct, strong, and related to personalized health goals.
Assess	- Willingness to quit and barriers to quitting should be assessed, as well as smoking history and current level of nicotine dependence; patients should be asked about their timeline for quitting and about previous attempts.	- Have you ever tried to cut back on or quit smoking? - Are you willing to quit smoking now? - What keeps you from quitting? - How soon after getting up in the morning do you smoke?
Assist	- Assist smokers ready to quit - Prepare patients' social support systems and their environment for the impending change. - Monitor the mood of smokers during quit attempts. - Screen for depression in those who have repeatedly been unable to quit. *Nicotine withdrawal: peak in the first three days of smoking cessation and subside over the next three to four weeks, Symptoms include increased appetite and weight gain, changes in mood (dysphoria or depression), insomnia, irritability, anxiety, and difficulty concentrating. *nrts can be helpful because they gradually decrease nicotine dependence; smokers should also be advised to decrease caffeine intake. - Treatment: Behavioral counseling and pharmacotherapy both have strong evidence of efficacy for smoking cessation and that the combination of the two methods produces the better results.	'I would like to help you quit. Can I tell you about some of the things we know can increase your odds of success?' 'Are you worried about anything in particular when it comes to quitting? Do you worry about cravings or weight gain?' ** Although some patients choose to cut back on smoking before their quit date, abrupt change is no less effective than gradual change in producing long-term abstinence.

Arrange	- Reinforcement, patients should be contacted around the time of their quit date, and at least four more times. - Monitor response to smoking cessation therapy. - Optimize treatment with first-line therapies if necessary. - Monitor for relapse or side effects of pharmacotherapy.	'I would like to see you in the office (or talk to you by phone) on your quit date. What problems have you had? Are there situations you worry about confronting without cigarettes?' *Abstinence by the quit date is highly predictive of long-term success.

If patient is unwilling to quit, use the 5 Rs motivation method

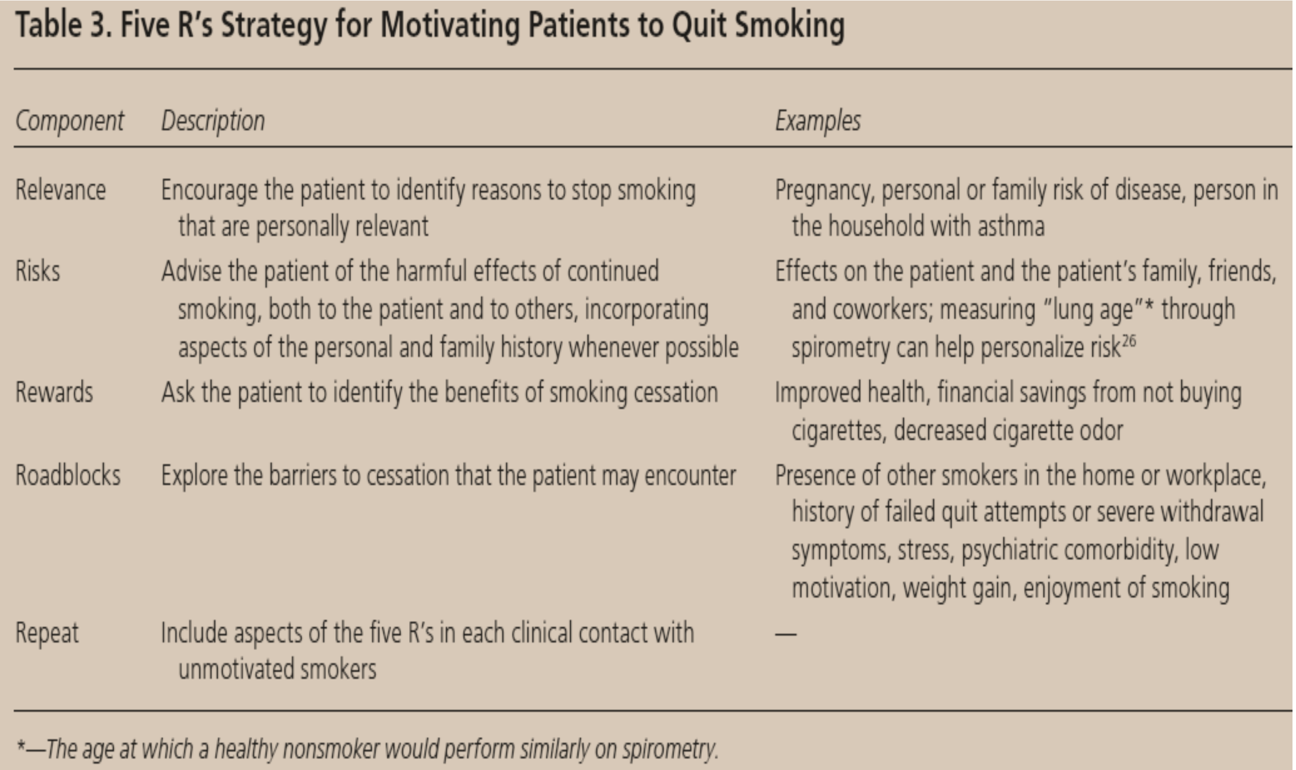


Table 3. Five R's Strategy for Motivating Patients to Quit Smoking

Component	*Description*	*Examples*
Relevance	Encourage the patient to identify reasons to stop smoking that are personally relevant	Pregnancy, personal or family risk of disease, person in the household with asthma
Risks	Advise the patient of the harmful effects of continued smoking, both to the patient and to others, incorporating aspects of the personal and family history whenever possible	Effects on the patient and the patient's family, friends, and coworkers; measuring "lung age"* through spirometry can help personalize risk[26]
Rewards	Ask the patient to identify the benefits of smoking cessation	Improved health, financial savings from not buying cigarettes, decreased cigarette odor
Roadblocks	Explore the barriers to cessation that the patient may encounter	Presence of other smokers in the home or workplace, history of failed quit attempts or severe withdrawal symptoms, stress, psychiatric comorbidity, low motivation, weight gain, enjoyment of smoking
Repeat	Include aspects of the five R's in each clinical contact with unmotivated smokers	—

**—The age at which a healthy nonsmoker would perform similarly on spirometry.*

Management:

Behavioral therapy:

mainly focusing on coping with cravings and temptations to smoking

Pharmacotherapy:

1. First line therapy:

A. Nicotine Replacement Therapy (NRT):

- Slow-release: skin patches.
- Rapidly acting forms: chewing gum, lozenges and (nasal spray, inhalers not available in KSA).

*Heavy smokers should be encouraged to use higher dosages of an NRT or try a "patch plus" method, using the nicotine patch to provide a base level of slowly delivered nicotine and adding a more rapidly acting NRT to control breakthrough cravings.

*Data indicate that the benefits of NRTs for smoking cessation outweigh the risks of the therapies. However, NRTs may have the potential to trigger cardiac events in the immediate post MI period, in patients with serious cardiac arrhythmias, and in patients with serious or worsening angina pectoris, physicians may consider a lower initial dosage, more frequent monitoring of side effects, and alternative therapies, such as behavioural interventions.

Dosage: patches: >10 cigarettes: 21mg
10 or less: 14mg
Gums and lozenges: <30 min awakening first cigarette: 4mg
30 min or more: 2mg

B. **Nicotinic Receptor Agonist:** Varenicline (Chantix).
C. **Bupropion**.

2. Combination therapy:

Possible combination therapy: bupropion and NTR, different types of NTR (short and long acting)

3. Second line therapy: (Not FDA-approved)

Clonidine (Catapres) and nortriptyline (Pamelor) also have demonstrated effectiveness in clinical trials for smoking cessation and they may be used if first-line medications are contraindicated or ineffective.

Withdrawal symptoms:

Irritability and anger, anxiety, difficulty concentrating, increased appetite, restlessness, depression, insomnia

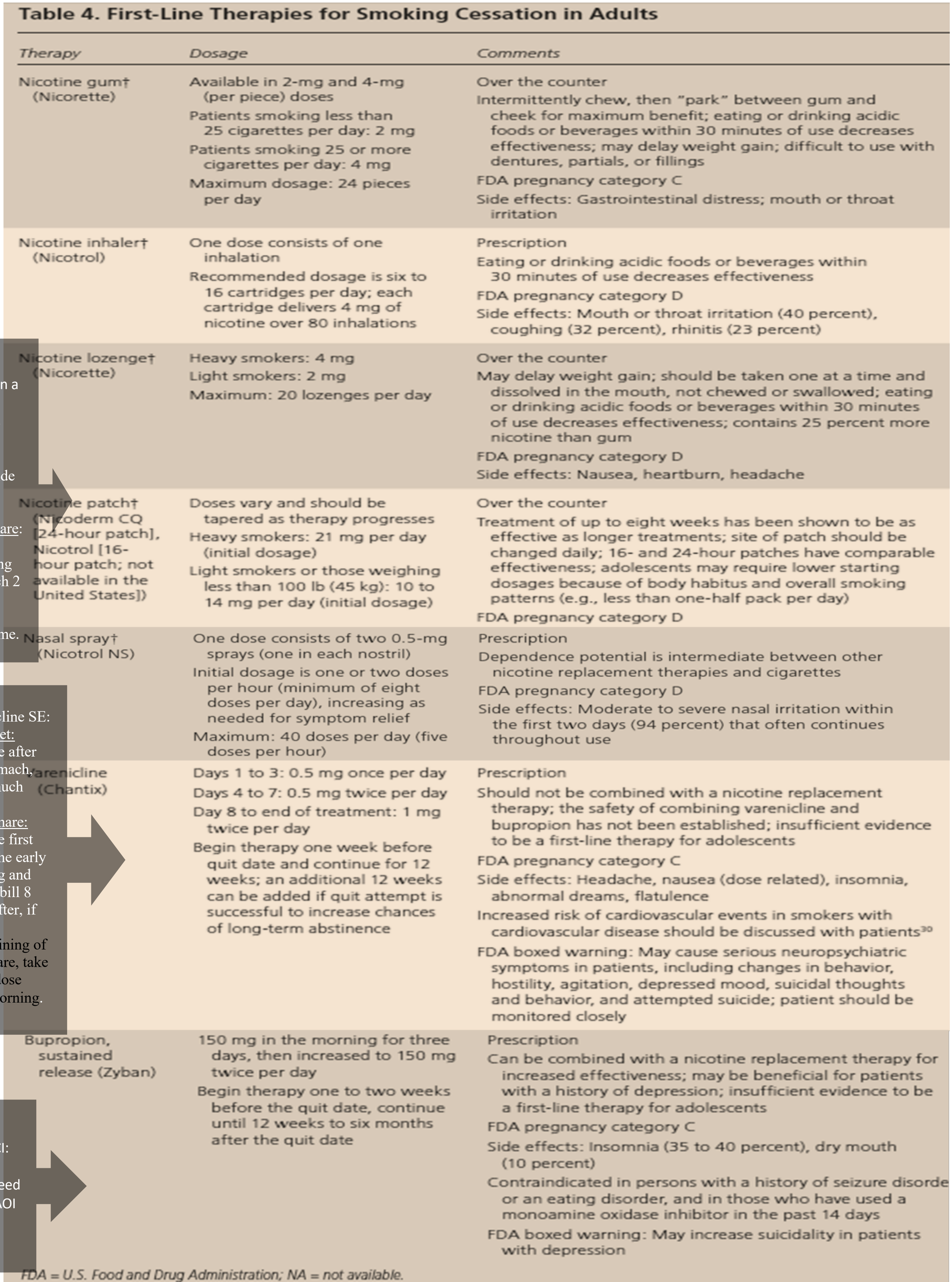


Table 4. First-Line Therapies for Smoking Cessation in Adults

Therapy	*Dosage*	*Comments*
Nicotine gum† (Nicorette)	Available in 2-mg and 4-mg (per piece) doses Patients smoking less than 25 cigarettes per day: 2 mg Patients smoking 25 or more cigarettes per day: 4 mg Maximum dosage: 24 pieces per day	Over the counter Intermittently chew, then "park" between gum and cheek for maximum benefit; eating or drinking acidic foods or beverages within 30 minutes of use decreases effectiveness; may delay weight gain; difficult to use with dentures, partials, or fillings FDA pregnancy category C Side effects: Gastrointestinal distress; mouth or throat irritation
Nicotine inhaler† (Nicotrol)	One dose consists of one inhalation Recommended dosage is six to 16 cartridges per day; each cartridge delivers 4 mg of nicotine over 80 inhalations	Prescription Eating or drinking acidic foods or beverages within 30 minutes of use decreases effectiveness FDA pregnancy category D Side effects: Mouth or throat irritation (40 percent), coughing (32 percent), rhinitis (23 percent)
Nicotine lozenge† (Nicorette)	Heavy smokers: 4 mg Light smokers: 2 mg Maximum: 20 lozenges per day	Over the counter May delay weight gain; should be taken one at a time and dissolved in the mouth, not chewed or swallowed; eating or drinking acidic foods or beverages within 30 minutes of use decreases effectiveness; contains 25 percent more nicotine than gum FDA pregnancy category D Side effects: Nausea, heartburn, headache
Nicotine patch† (Nicoderm CQ [24-hour patch], Nicotrol [16-hour patch; not available in the United States])	Doses vary and should be tapered as therapy progresses Heavy smokers: 21 mg per day (initial dosage) Light smokers or those weighing less than 100 lb (45 kg): 10 to 14 mg per day (initial dosage)	Over the counter Treatment of up to eight weeks has been shown to be as effective as longer treatments; site of patch should be changed daily; 16- and 24-hour patches have comparable effectiveness; adolescents may require lower starting dosages because of body habitus and overall smoking patterns (e.g., less than one-half pack per day) FDA pregnancy category D
Nasal spray† (Nicotrol NS)	One dose consists of two 0.5-mg sprays (one in each nostril) Initial dosage is one or two doses per hour (minimum of eight doses per day), increasing as needed for symptom relief Maximum: 40 doses per day (five doses per hour)	Prescription Dependence potential is intermediate between other nicotine replacement therapies and cigarettes FDA pregnancy category D Side effects: Moderate to severe nasal irritation within the first two days (94 percent) that often continues throughout use
Varenicline (Chantix)	Days 1 to 3: 0.5 mg once per day Days 4 to 7: 0.5 mg twice per day Day 8 to end of treatment: 1 mg twice per day Begin therapy one week before quit date and continue for 12 weeks; an additional 12 weeks can be added if quit attempt is successful to increase chances of long-term abstinence	Prescription Should not be combined with a nicotine replacement therapy; the safety of combining varenicline and bupropion has not been established; insufficient evidence to be a first-line therapy for adolescents FDA pregnancy category C Side effects: Headache, nausea (dose related), insomnia, abnormal dreams, flatulence Increased risk of cardiovascular events in smokers with cardiovascular disease should be discussed with patients[30] FDA boxed warning: May cause serious neuropsychiatric symptoms in patients, including changes in behavior, hostility, agitation, depressed mood, suicidal thoughts and behavior, and attempted suicide; patient should be monitored closely
Bupropion, sustained release (Zyban)	150 mg in the morning for three days, then increased to 150 mg twice per day Begin therapy one to two weeks before the quit date, continue until 12 weeks to six months after the quit date	Prescription Can be combined with a nicotine replacement therapy for increased effectiveness; may be beneficial for patients with a history of depression; insufficient evidence to be a first-line therapy for adolescents FDA pregnancy category C Side effects: Insomnia (35 to 40 percent), dry mouth (10 percent) Contraindicated in persons with a history of seizure disorde or an eating disorder, and in those who have used a monoamine oxidase inhibitor in the past 14 days FDA boxed warning: May increase suicidality in patients with depression

FDA = U.S. Food and Drug Administration; NA = not available.

Put the patch on a clean hairless area
Other patch side effect:
- Nightmare: Rx: removing the patch 2 hours before sleep time.

Other Varenicline SE:
-GI upset: Rx: take after full stomach, drink much water.
-Nightmare: Rx: take first bill in the early morning and second bill 8 hours after, if still complaining of nightmare, take single dose early morning.

Other CI: DM, breastfeed and MAOI use

Smoking Cessation
MCQs

ABFM 2022

A 69-year-old male is found to have an infrarenal abdominal aortic aneurysm (AAA) on screening ultrasonography. Which one of the following is most important when determining the risk of his AAA rupturing?

A. His age
B. His sex
C. His history of hypertension
D. His history of smoking
E. The diameter of his aneurysm

ANSWER: E

The single most important determinant of the risk that an abdominal aortic aneurysm (AAA) will rupture is the diameter of the aneurysm. In men, aneurysm repair is recommended when the aneurysm reaches 5.5 cm in diameter. In women, whose aortas tend to be smaller, the recommended maximum diameter is 5.0 cm. Age, sex, a history of hypertension, and a history of smoking all increase the risk of developing an AAA, but do not increase the risk of rupture.

A 51-year-old patient asks about recommended lung cancer screenings. The U.S. Preventive Services Task Force recommends annual lung cancer screening with low-dose CT for individuals starting at age:

A. 45 with a 15-pack-year smoking history
B. 50 with a 20-pack-year smoking history
C. 55 with a 30-pack-year smoking history
D. 60 with a 35-pack-year smoking history
E. 65 with a 40-pack-year smoking history

ANSWER: B

Lung cancer is the second most common cancer in both women and men, after breast cancer for women and prostate cancer for men. It is the leading cause of cancer deaths in the United States, making it important for primary care providers to screen for this disease process. The primary risk factor for lung cancer is tobacco smoking, which accounts for 90% of all lung cancer cases. Lung cancer has a relatively poor prognosis, but early-stage lung cancer is more amenable to treatment and has a better prognosis. Low-dose CT has a reasonable specificity and high sensitivity for lung cancer in patients at high risk. The eligibility criteria were recently updated by the U.S. Preventive Services Task Force due to evidence of mortality benefit, with a recommendation for screening to begin at age 50 for patients with a 20-pack-year smoking history who are current smokers or have quit within the past 15 years.

Midyear 2022

Which of the following is accurate about nicotine replacement therapy (NRT)

A. Transdermal nicotine patches are associated with lower compliance rates and higher side effects than NRT designed for acute dosing.
B. Nicotine gum is the NRT capable of delivering nicotine the most rapidly.
C. The amount of nicotine absorbed per nicotine lozenge is somewhat lower than that absorbed from nicotine gum.
D. NRT use increases the quit rate by 50%-70%, and the increase appears independent of any additional support provided.

Answer: D

Part 1 2022

67-year-old male, K/C HTN and he is smoker, came with hypogastric painful mass, on examination pulsatile mass bellow the umbilicus, abdominal bruit by auscultation. What is the next step?

A. US
B. CT Angiography
C. CT without contrast
D. KUB

Answer: A.
US: SMOKER, >65y with pulsating abdominal mass = AAA
AAA:
- Next → US
- BEST → CT angio

Promotion 2022

A 70 year old male currently smoker came for annual check known to have hypertension has history of 10 pack-year smoking. Which preventive screening?

A- Aortic US

B- Low dose CT lung
C- PSA

Answer: A

Diabetic pt came for smoking cessation with pervious failed attempt what to give now

A- bupropion
B- buspirone

Answer: A

50y.o with history of DM, depression, she is smoking welling to quit. Previous attempt failed. HgbA1c 8 Asking about smoking cessation options?

C- Vernalcline
D- Nicotine replacement therapy
E- Cognitive behavioral therapy
F- ..

Answer: ????

ABFM 2021

A 14-year-old female is brought to your office for a well child check and a sports physical examination. During the substance abuse screening she says that she does not drink alcohol or smoke marijuana or traditional cigarettes, but occasionally uses e-cigarettes with her friends.
Which one of the following statements describing e-cigarettes is true?

A. E-cigarettes do not contain heavy metals
B. The nicotine in e-cigarettes is not addictive
C. Teens who use e-cigarettes are less likely to use marijuana
D. More teens use traditional cigarettes than e-cigarettes
E. E-cigarette use among teens increases the likelihood of cigarette smoking

ANSWER: E

E-cigarette use has become quite popular among youth in the United States, with rates surpassing traditional cigarette use in 2014. Among teens who have never smoked, the odds of cigarette smoking are 3–6 times higher in those who have used e-cigarettes within the last year. Nicotine is highly addictive regardless of the source, and heavy metal toxicants are still present when using e-cigarettes, although less than with traditional cigarettes. E-cigarette use is associated with an increased risk of future marijuana use.

A 63-year-old male presents for advice on smoking cessation. He was recently hospitalized with acute coronary syndrome and is highly motivated to quit smoking. He says that he has quit several times in the past but never for an extended period of time. He currently smokes 10 cigarettes per day. In addition to behavioral support resources such as 1-800-QUIT-NOW, you decide to prescribe a nicotinic receptor partial agonist.
Which one of the following belongs to this class of medications?

A. Acamprosate
B. Bupropion (Wellbutrin SR)
C. Clonidine (Catapres)
D. Naltrexone
E. Varenicline (Chantix)

ANSWER: E
Varenicline, an 4- 2 nicotinic receptor partial agonist, works to reduce nicotine withdrawal by activating the nicotine receptor and producing about 50% of the effect of nicotine. It also prevents tobacco smoke nicotine from binding to the receptor. Acamprosate is a gamma-aminobutyric acid (GABA) agonist and glutamate antagonist that is effective for the treatment of alcohol use disorder. Bupropion is a norepinephrine-dopamine reuptake inhibitor that reduces nicotine withdrawal and the reward from tobacco smoking. Clonidine is an 2-adrenergic agonist, and it has been shown to assist with smoking cessation but is not FDA approved for this purpose. Naltrexone is a pure opioid receptor antagonist that is effective for the treatment of alcohol use disorder and opioid use disorder.

Promotion 2021

A male known to have a seizure disorder on medication present to the clinic to quit smoking, which one of the following medications is appropriate for him?

A. Bupropion
B. Varenicline
C. Nicotine patch
D. SNRI

ANSWER: B
First-line therapies include nicotine replacement, bupropion, and varenicline. The patient’s seizure disorder contraindicates the use of bupropion. Varenicline is a selective nicotinic receptor partial agonist. There are no known drug interactions, and it is largely excreted in the urine. Dose modifications would be needed in people with severe renal disease. Common side effects include nausea, insomnia, and abnormal dreams. It is safe in

persons with seizure disorders. Varenicline is taken for 1 week before the quit date, and therefore can be taken while a person is still smoking.

ABFM 2020

You are advising a group of medical students who are planning a tobacco cessation program for expectant mothers. The medical students want to build an advertising program that touts the pregnancy benefits of tobacco cessation. You tell the medical students that evidence suggests that tobacco cessation in pregnant women:

A. Decreases the risk for cesarean delivery
B. Decreases the risk for preeclampsia
C. Decreases the need for epidural anesthesia
D. Increases infant birth weight
E. Increases the risk for preterm delivery

ANSWER: D

Smoking during pregnancy increases the risk for fetal growth restriction. The U.S. Preventive Services Task Force identified evidence that tobacco cessation increases infant birth weight and decreases the risk for preterm delivery. There is no evidence that tobacco cessation in pregnant women decrease the risk for cesarean delivery, the risk for preeclampsia, or the need for epidural anesthesia.

A 72-year-old male comes to your office for an annual health maintenance visit. He mentions that some of his friends recently underwent health screenings and he asks if there are any cardiovascular screening tests recommended for him. His blood pressure is well controlled and he does not have any shortness of breath or chest pain. He exercises regularly. He started smoking cigarettes while he attended college but quit at age 25. He does not have a significant family history of cardiovascular disease. Which one of the following tests is recommended by the U.S. Preventive Services Task Force for patients such as this?

A. An ankle-brachial index
B. A high-sensitivity C-reactive protein level
C. A coronary artery calcium score
D. Abdominal aortic aneurysm screening with ultrasonography
E. Echocardiography

ANSWER: D

This patient is male, over the age of 65, and smoked in the past, so he meets the criteria for one- time screening for an abdominal aortic aneurysm (AAA) recommended by the U.S. Preventive Services Task Force (USPSTF) (B recommendation). This screening is associated with decreased AAA-related mortality. The USPSTF found insufficient evidence for screening asymptomatic adults for cardiovascular disease with an ankle-brachial index, high-sensitivity C-reactive protein level, or coronary artery calcium score. Screening asymptomatic individuals with echocardiography is not recommended at this time.

You see a 60-year-old male for an initial office visit. He has a past history of a myocardial infarction. He has smoked two packs of cigarettes daily since the age of 18. He says that he enjoys smoking and has no plans to quit.
Which one of the following would be the most appropriate response?

A. I must advise you that smoking is very bad for your health
B. Did you know that smoking increases your risk of another heart attack?
C. What do you know about smoking's effect on your health in general?
D. Would it be okay if we discuss smoking?
E. Can I schedule a follow-up appointment soon to focus on quitting smoking?

ANSWER: D
The stages of change model include precontemplation, contemplation, preparation, action, and maintenance. Identifying which stage a patient is in can help guide physicians in counseling strategies. The goal is to move the patient toward taking action. This patient is in the precontemplation stage. He has no interest in changing and is opposed to quitting smoking. At this stage it is best to use the motivational interviewing technique of asking permission before presenting information and if given permission to share it in a neutral manner. Motivational interviewing has been shown to be useful in primary care for helping patients to reduce weight, blood pressure, and alcohol use (SOR A). Emphasizing the consequences of smoking or asking to schedule a follow-up visit to focus on smoking cessation may increase resistance and may also reduce patient openness to physician input at this stage.

Part 2019

A 67-year-old male with past history of 20 years of smoking was evaluated for abdominal aortic aneurysm and was found to be 4.2 cm. He is Asymptomatic. What is appropriate approach for him?

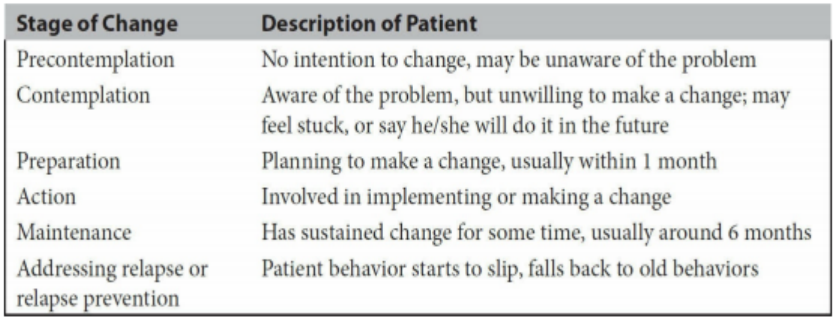
A. Reassurance
B. Referral for surgery
C. Repeat evaluation after 6-12 months
D. Abdominal CT

ANSWER: C
According to the 2018 SVS guidelines, if the AAA is between 3.0 and 3.9 cm, surveillance imaging at 3-year intervals is suggested. If the AAA is between 4.0 and 4.9 cm, surveillance imaging at 12-month intervals is suggested. If the AAA is between 5.0 and 5.4 cm, surveillance imaging at 6-month intervals is suggested.(Medscape)

Part 2018

Patient smoker presented for HTN follow up. He stated that he still didn't think seriously to stop smoking but his family encouraged him to quit smoking. Which stage is the patient in?

A. Contemplation phase
B. Precontemplation phase
C. Action
D. Preparation



Stage of Change	Description of Patient
Precontemplation	No intention to change, may be unaware of the problem
Contemplation	Aware of the problem, but unwilling to make a change; may feel stuck, or say he/she will do it in the future
Preparation	Planning to make a change, usually within 1 month
Action	Involved in implementing or making a change
Maintenance	Has sustained change for some time, usually around 6 months
Addressing relapse or relapse prevention	Patient behavior starts to slip, falls back to old behaviors

ANSWER: B

Promotion 2016

A 38 years' woman with 3 children, works 9 hours a day in high stress job. She smokes 10 cigarettes per day, eats fast food 3 times per week, do not exercise. Her physical examination was normal. Bp 122/76 Pulse 80 Temperature 37 BMI 27. Which life style alteration will have the most effect?

A. Smoking cessation
B. Eating healthy food
C. Exercise 30 minutes for 5 days per week
D. Stress management and relaxation technique

ANSWER: A

ABFM 2015-2018

Which one of the following is true regarding electronic cigarettes?

A. They release lower concentrations of particulate matter than tobacco cigarettes
B. They are a nicotine-free alternative to tobacco
C. They are not regulated by the FDA
D. They have been proven to be effective for smoking cessation
E. They have been shown to be safe in pregnancy

ANSWER: C
Electronic cigarettes (e-cigarettes) are not currently regulated by the FDA. The amount of particulate matter released into the air by low-nicotine e-cigarettes is comparable to that released by tobacco cigarettes, while higher-nicotine e-cigarettes release more particulate matter. E-cigarettes have various concentrations of nicotine in solution. While the number of tobacco cigarettes smoked per day is decreased in e-cigarette users, this has not yet been shown to lead to smoking cessation. There are no studies of e-cigarettes in pregnant women, and nicotine is contraindicated during pregnancy.

A 53-year-old female with a past medical history of hypertension and high cholesterol presents to discuss options for tobacco cessation. She has a 30-pack-year history of smoking and currently smokes between 1 and 1½ packs per day. She tried varenicline (Chantix) but had nightmares while she was using it and does not want to try it again. Many of her family members have seizure disorders and she is therefore hesitant to try bupropion (Wellbutrin). She has used nicotine patches with minimal success. Which one of the following pharmacotherapies would be most likely to help in her effort to stop smoking?

A. Fluoxetine (Prozac)
B. Naltrexone (ReVia)
C. Nortriptyline (Pamelor)
D. Selegiline (Eldepryl)
E. St. John's wort

ANSWER: C

Trials have evaluated various antidepressant medications as aids in tobacco cessation. Both bupropion and nortriptyline have been found to increase smoking cessation success rates. Because this patient does not want to try bupropion, nortriptyline would be a reasonable option. Studies have shown similar efficacy for these two medications, although there is a lack of evidence for increased efficacy when these medications are added to nicotine replacement therapy. Studies have not shown a benefit for promoting tobacco cessation with SSRIs such as fluoxetine, monoamine oxidase inhibitors such as selegiline, opioid antagonists such as naltrexone, or St. John's wort.

Which one of the following is the strongest modifiable risk factor for abdominal aortic aneurysm?

A. Cigarette smoking
B. Excessive alcohol consumption
C. Hyperlipidemia
D. Hypertension
E. Type 2 diabetes mellitus

ANSWER: A

Smoking is the strongest modifiable risk factor for the development of an abdominal aortic aneurysm. Nonmodifiable risk factors include older age, male sex, and a family history of the problem. Other less prominent risk factors include hypertension, an elevated cholesterol level, obesity, and preexisting atherosclerotic occlusive disease.

A 78-year-old male presents for a routine health maintenance examination and is concerned about a gradual loss in his vision during the past year. He has smoked 1 pack of cigarettes per day for the past 60 years. He has no other medical problems. On Amsler grid testing he notes distorted grid lines. Which one of the following would you recommend for this patient?

A. Watchful waiting
B. Avoiding all vitamin supplements
C. Treatment to reverse his visual changes
D. Smoking cessation to prevent further vision loss

ANSWER: D

This patient presents with signs and symptoms that suggest age-related macular degeneration. Smoking is a modifiable risk factor and smokers should be counseled to quit (SOR C). The patient should be referred to an ophthalmologist for further evaluation and management. Watchful waiting would not be appropriate. Vitamin supplements with Age-Related Eye Disease (AREDS) and AREDS2 formulations have been shown to delay visual loss in patients with age-related macular degeneration (SOR A). Age-related macular degeneration is not reversible but treatment can delay progression or stabilize the changes (SOR A).

A rural community college has requested your guidance in offering a preventive health program to its students. The most appropriate plan would include which one of the following?

A. Mammograms for female students
B. Lead poisoning screening for all students
C. Stool occult blood kits for all students
D. Smoking cessation programs for students who smoke
E. An annual routine physical examination for all students

Answer: D

The U.S. Preventive Services Task Force does not recommend routine physical examinations but recommends blood pressure screenings every 3–5 years for adults 18–39 years of age who are at low risk for hypertension. Mammograms are not recommended until age 40. Lead screening is recommended for at-risk individuals between 6 months and 6 years of age. Colorectal cancer screening for average-risk individuals is recommended at age 50. Counseling on tobacco use and other substance abuse is recommended as part of all routine preventive care.

ABFM 2013

A 42-year-old male sees you for help to quit smoking. His sister had excellent results with bupropion (Zyban) and he asks if he could try using it. When you review his medical history, which one of the following would be a contraindication to bupropion?

A. Diabetes mellitus
B. Gout
C. Hypertension

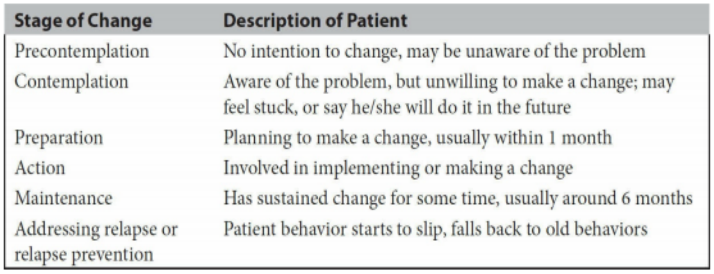
D. Hyperthyroidism
E. A seizure disorder

Answer: E

Part 2006-2016

Adult male heavy smoker. came to you want to quit smoking. what is the stage of behavioral change?

A. Precontemplation
B. Contemplation
C. Preparation
D. Action



Stage of Change	Description of Patient
Precontemplation	No intention to change, may be unaware of the problem
Contemplation	Aware of the problem, but unwilling to make a change; may feel stuck, or say he/she will do it in the future
Preparation	Planning to make a change, usually within 1 month
Action	Involved in implementing or making a change
Maintenance	Has sustained change for some time, usually around 6 months
Addressing relapse or relapse prevention	Patient behavior starts to slip, falls back to old behaviors

Answer: C

Pre-test:

You are seeing a patient with a smoking history for a routine health examination. Which of the following attributes would exclude this patient from the current USPSTF lung cancer screening recommendations with low-dose computed tomography (LDCT) of the chest?

A. A 79-year-old man who quit smoking 10 years ago
B. A 65-year-old woman who quit smoking 20 years ago
C. A 56-year-old man with a 30-pack-year smoking history
D. A 75-year-old woman who continues to smoke.
E. A 71-year-old woman who has signed a Do Not Resuscitate (DNR) order.

ANSWER: B

The USPSTF has concluded that screening for lung cancer with LDCT is of moderate net benefit in asymptomatic individuals at high risk for lung cancer. They recommend screening in individuals “aged 55 to 80 who have a more than or equal to 30- pack-year smoking history and currently smoke or have quit within the past 15 years.” The task force recommends discontinuing screening once a patient has not smoked for 15 years,

and recommend not screening if the patient has a condition resulting in a limited life- expectancy, or would not be able or willing to undergo curative lung surgery. This recommendation is somewhat controversial, due to the concerns for radiation exposure over the 25-year span based on a study that occurred over a 3-year period.

You are seeing a 34-year-old smoker in your office. She says she's thought about quitting, and although she's tried to quit unsuccessfully in the past, she's ready to consider making another attempt. Which of the following questions is the best example of using motivational interviewing with this patient?

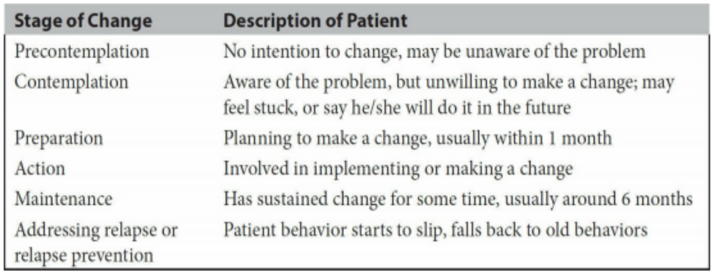
A. "Are you really interested in quitting this time?"
B. "Has anyone close to you been able to successfully quit?"
C. "How will you make sure you're never going to smoke again?"
D. "What do you think will be hardest about trying to quit this time?"
E. "What is one step you can take to get you to your goal?"

ANSWER: E

Motivational interviewing is a technique conceived in the early 1980s,and is a directive, client-centered style that elicits behavior change by helping people explore and resolve ambivalence. It's an alternative to other motivational techniques often used by clinicians (including education, persuasion, or fear). The objective is not to solve the patient's problem or even develop a plan—the goal is to help the patient explore his/her own issues and let the patient develop the plan with guidance by the clinician. Using the technique, providers can help the patient identify a specific and achievable goal—but it's important for the provider to remember that it's the patient's goal that's important—not the provider's goal for the patient. The first step in motivational interviewing is asking open-ended questions that help move the patient toward a stated goal. Stating something like, "What is one behavior you can change in order to improve your health?" is a good example. In the scenario described in this question, answer e is the best example of motivational interviewing, as it helps the patient to focus on her own goal, and identifies a first step to take to achieve the goal. The first two answers are closed-ended questions that are not part of motivational interviewing. Answer c assumes that the patient's goal is to never smoke again. Answer d will help identify barriers, but is not part of motivational interviewing technique.

You are addressing smoking cessation with a patient and are determining the patient's readiness to change his behaviors. During the discussion, you find that the patient is aware of the health impact of his smoking on him and his family. He understands the economic impact, and feels that if he were to quit, it would benefit him financially. He feels very addicted to cigarettes and says that he'd like to quit sometime in the future. According to the Stages of Change Model, at what stage of change is this patient?

A. Precontemplation
B. Contemplation
C. Preparation
D. Action
E. Maintenance



Stage of Change	Description of Patient
Precontemplation	No intention to change, may be unaware of the problem
Contemplation	Aware of the problem, but unwilling to make a change; may feel stuck, or say he/she will do it in the future
Preparation	Planning to make a change, usually within 1 month
Action	Involved in implementing or making a change
Maintenance	Has sustained change for some time, usually around 6 months
Addressing relapse or relapse prevention	Patient behavior starts to slip, falls back to old behaviors

ANSWER: B

You are caring for a patient who would like to quit smoking. She failed nicotine patches. Which of the following is an appropriate next step?

A. Add nicotine gum to the patch
B. Use clonidine

C. Use a tricyclic antidepressant
D. Use an SSRI
E. Use a selective serotonin and norepinephrine reuptake inhibitor

ANSWER: A

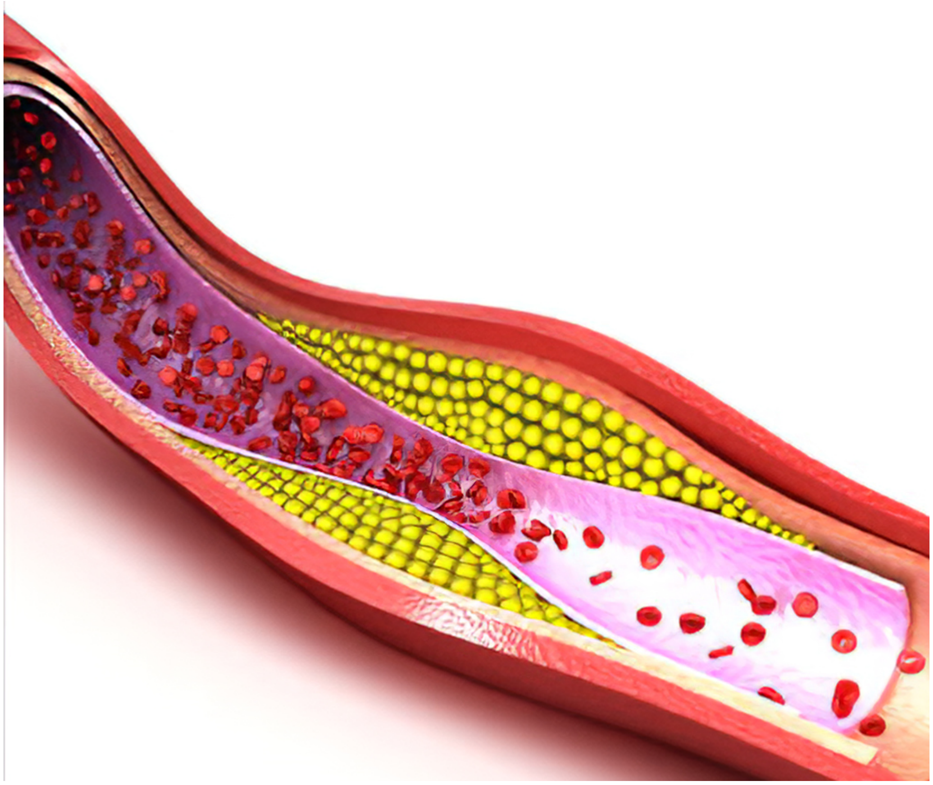
Nicotine-replacement therapy increases the chance that a smoker will quit. Using two forms of nicotine replacement, like a patch and a gum, allows a baseline level of nicotine to be in the patient's system and allows for a bolus during times of craving. This improves quit rates and is recommended if a single form of nicotine replacement is ineffective alone.

You are currently evaluating a patient for unstable angina. He takes phenytoin for a seizure disorder, has high cholesterol, and is a current smoker. Which of the following would be the best therapeutic option to help with his smoking cessation plan?

A. Behavioral intervention
B. Nicotine replacement
C. Bupropion
D. Varenicline
E. Clonidine

ANSWER: D

Behavioral intervention alone is an option for this patient, but you would at least double his success rate if you add medication. First-line therapies include nicotine replacement, bupropion, and varenicline. Although nicotine-containing products are not associated with acute cardiac events, nicotine replacement should be used with caution when working up unstable angina. The patient's seizure disorder contraindicates the use of bupropion. Clonidine is not approved by the FDA for smoking cessation, but several studies have shown that it doubles the rate of abstinence. Varenicline is a selective nicotinic receptor partial agonist. There are no known drug interactions, and it is largely excreted in the urine. Dose modifications would be needed in people with severe renal disease. Common side effects include nausea, insomnia, and abnormal dreams. It is safe in persons with seizure disorders. Varenicline is taken for 1 week before the quit date, and therefore can be taken while a person is still smoking.



Dyslipidemia

Collected by: Faisal Algahtani R2
Reviewed by: Abdulrahman Bamhair R1
Editing and final revision: Nuha Almasoud R3

Dyslipidemia

Dyslipidemia is elevation of plasma cholesterol, triglycerides (TGs), or both. or a low HDL cholesterollevel that contributes to the development of atherosclerosis.

Risk factors:

- Personal history of CHD or non-coronary atherosclerosis (e.g., AAA, PAD, carotid artery stenosis, MI,ischemic stroke).
- Family history of cardiovascular disease before 50 years of age in male relatives or 60 years of age infemale relatives.
- Age ≥65.
- Diabetes.
- Tobacco use.
- Hypertension.
- Obesity (BMI > 30).
- Metabolic syndrome.
- Chronic kidney disease.
- Chronic inflammatory conditions such as psoriasis, rheumatoid arthritis, or HIV/AIDS.
- History of premature menopause (before age 40) and history of pregnancy-associated conditions thatincrease later ASCVD risk such as pre-eclampsia.
- High-risk race/ethnicities (e.g., South Asian ancestry).

Primary Dyslipidemia (Genetic) Like FH:

Familial hypercholesterolemia (FH) is an autosomal dominant disorder that causes severe elevations in total cholesterol and low-density lipoprotein cholesterol (LDLc).

If left untreated, tendon xanthomas will occur by the third decade of life in more than 60% of patients.

Diagnosis:

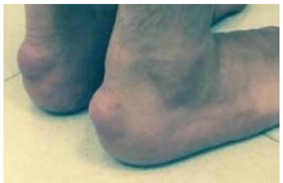
- ➢ American Heart Association criteria for the clinical diagnosis of FH: low-density lipoprotein cholesterol (LDL-C) >190 mg/dL (>4.9 mmol/L) and either a first degree relative with LDL-C>190 mg/dL or with known premature coronary heart disease (55 years men; <60 years women). Other diagnostic criteria are also present for the diagnosis like Dutch Lipid Clinic & Simon Broome Criteria.

Secondary Dyslipidemia:

The most important secondary cause in high-resource countries is a **sedentary lifestyle with excessivedietary intake of calories, saturated fat, cholesterol, and trans fats.**

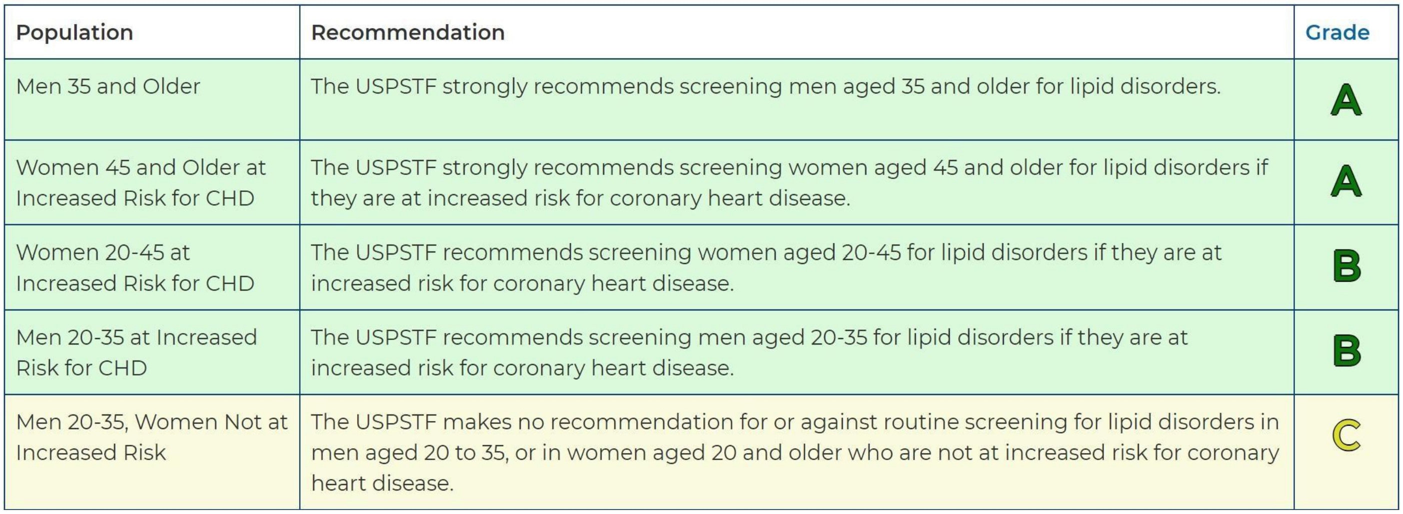
Other common secondary causes of dyslipidemia include:

- Diabetes mellitus.
- Chronic kidney disease.
- Alcohol overuse.
- Hypothyroidism.
- Primary biliary cirrhosis and other cholestatic liver diseases.
- Drugs, such as thiazides, beta-blockers, retinoids, highly active antiretroviral agents, cyclosporine,tacrolimus, estrogen and progestins, and glucocorticoids.
- Secondary causes of low levels of HDL cholesterol include cigarette smoking, anabolic steroids, HIVinfection, and nephrotic syndrome.



Screening and Primary Prevention

Screening for Lipid Disorders in Adults (USPSTF)



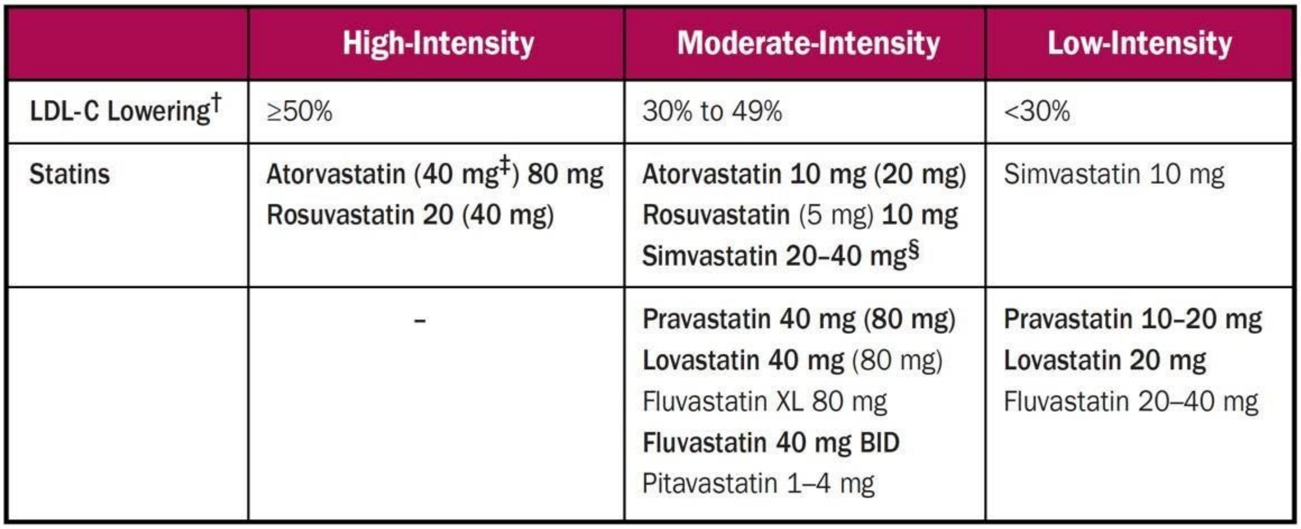
Population	Recommendation	Grade
Men 35 and Older	The USPSTF strongly recommends screening men aged 35 and older for lipid disorders.	A
Women 45 and Older at Increased Risk for CHD	The USPSTF strongly recommends screening women aged 45 and older for lipid disorders if they are at increased risk for coronary heart disease.	A
Women 20-45 at Increased Risk for CHD	The USPSTF recommends screening women aged 20-45 for lipid disorders if they are at increased risk for coronary heart disease.	B
Men 20-35 at Increased Risk for CHD	The USPSTF recommends screening men aged 20-35 for lipid disorders if they are at increased risk for coronary heart disease.	B
Men 20-35, Women Not at Increased Risk	The USPSTF makes no recommendation for or against routine screening for lipid disorders in men aged 20 to 35, or in women aged 20 and older who are not at increased risk for coronary heart disease.	C

Screening for Lipid Disorders in Children and adolescent From (2012 National Heart Lung and Blood Institute)

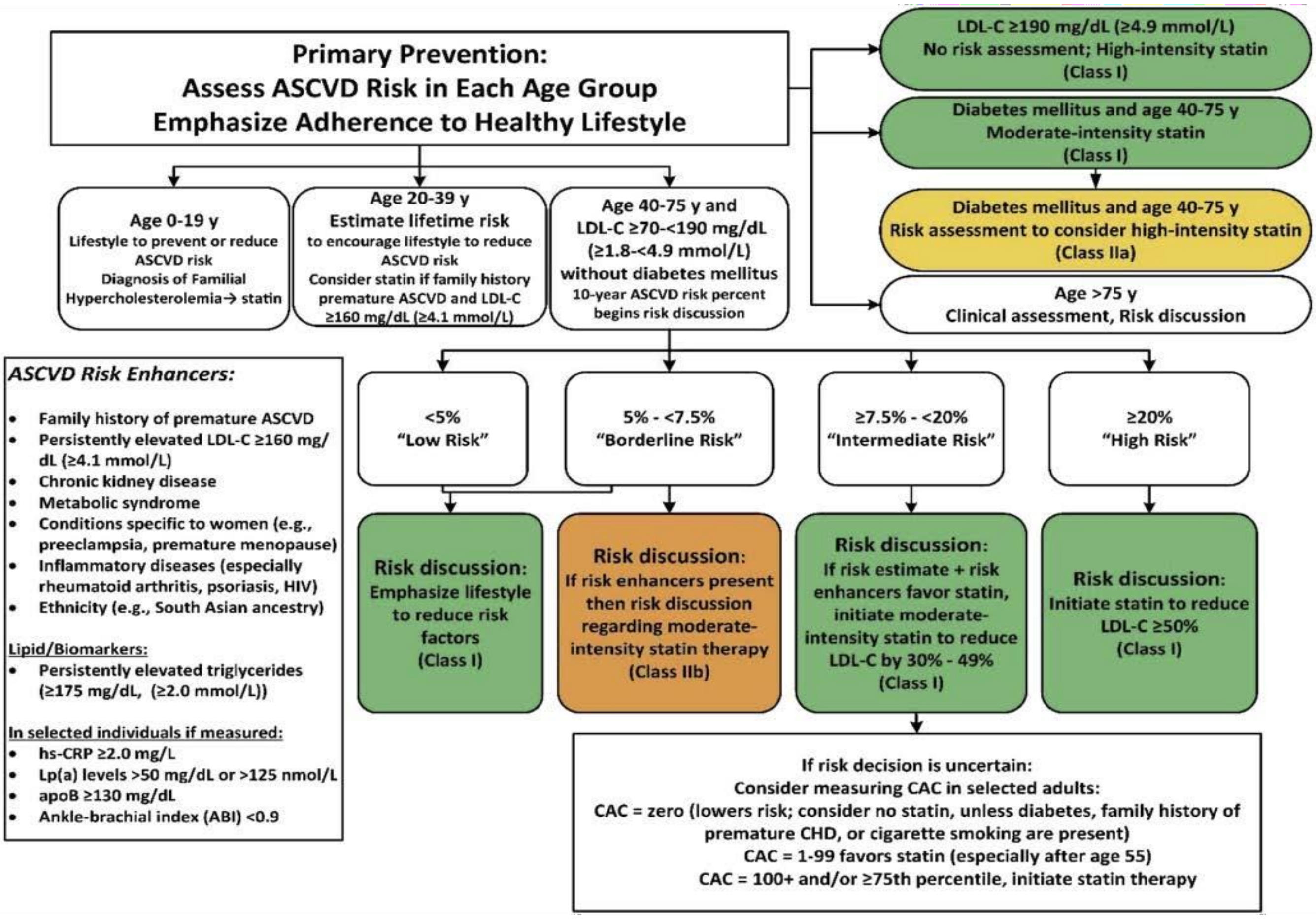
- Children with risk factors (eg, diabetes, hypertension, family history of severe hyperlipidemia or prematureCAD):
  - Fasting lipid profile once at age 2 to 8.
- Children with no risk factors:
  - Non-fasting or fasting lipid profile once before puberty (usually age 9 to 11) and once more at age 17to 21.

Management: The main aim of Dyslipidemia management is to reduce the risk of atherosclerotic cardiovasculardiseases. How can we achieve that?

- Lifestyle modifications like (Wight loss, Exercises, and low-fat diet).
- Medications (statin, Ezetimibe & PCSK9 inhibitors).



	High-Intensity	Moderate-Intensity	Low-Intensity
LDL-C Lowering[†]	≥50%	30% to 49%	<30%
Statins	**Atorvastatin (40 mg[‡]) 80 mg** **Rosuvastatin 20 (40 mg)**	**Atorvastatin 10 mg (20 mg)** **Rosuvastatin** (5 mg) **10 mg** **Simvastatin 20–40 mg[§]**	Simvastatin 10 mg
	-	**Pravastatin 40 mg (80 mg)** **Lovastatin 40 mg** (80 mg) Fluvastatin XL 80 mg **Fluvastatin 40 mg BID** Pitavastatin 1–4 mg	**Pravastatin 10–20 mg** **Lovastatin 20 mg** Fluvastatin 20–40 mg



Primary Prevention: Assess ASCVD Risk in Each Age Group Emphasize Adherence to Healthy Lifestyle

LDL-C ≥190 mg/dL (≥4.9 mmol/L)
No risk assessment; High-intensity statin
(Class I)

Diabetes mellitus and age 40-75 y
Moderate-intensity statin
(Class I)

Diabetes mellitus and age 40-75 y
Risk assessment to consider high-intensity statin
(Class IIa)

Age >75 y
Clinical assessment, Risk discussion

Age 0-19 y
Lifestyle to prevent or reduce ASCVD risk
Diagnosis of Familial Hypercholesterolemia→ statin

Age 20-39 y
Estimate lifetime risk to encourage lifestyle to reduce ASCVD risk
Consider statin if family history premature ASCVD and LDL-C ≥160 mg/dL (≥4.1 mmol/L)

Age 40-75 y and LDL-C ≥70-<190 mg/dL (≥1.8-<4.9 mmol/L) without diabetes mellitus
10-year ASCVD risk percent begins risk discussion

ASCVD Risk Enhancers:

- Family history of premature ASCVD
- Persistently elevated LDL-C ≥160 mg/dL (≥4.1 mmol/L)
- Chronic kidney disease
- Metabolic syndrome
- Conditions specific to women (e.g., preeclampsia, premature menopause)
- Inflammatory diseases (especially rheumatoid arthritis, psoriasis, HIV)
- Ethnicity (e.g., South Asian ancestry)

Lipid/Biomarkers:

- Persistently elevated triglycerides (≥175 mg/dL, (≥2.0 mmol/L))

In selected individuals if measured:

- hs-CRP ≥2.0 mg/L
- Lp(a) levels >50 mg/dL or >125 nmol/L
- apoB ≥130 mg/dL
- Ankle-brachial index (ABI) <0.9

<5%
"Low Risk"

5% - <7.5%
"Borderline Risk"

≥7.5% - <20%
"Intermediate Risk"

≥20%
"High Risk"

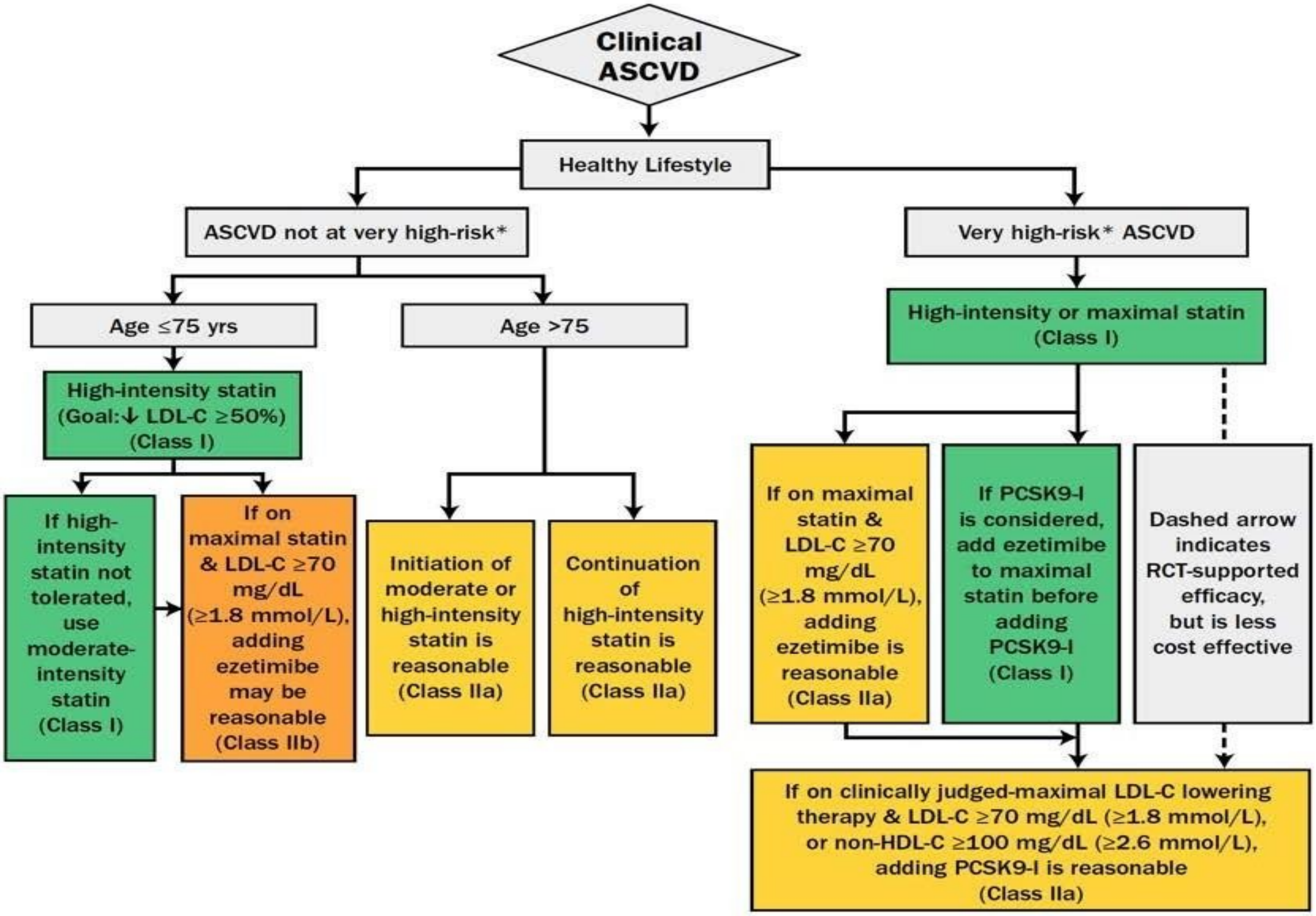
Risk discussion:
Emphasize lifestyle to reduce risk factors
(Class I)

Risk discussion:
If risk enhancers present then risk discussion regarding moderate-intensity statin therapy
(Class IIb)

Risk discussion:
If risk estimate + risk enhancers favor statin, initiate moderate-intensity statin to reduce LDL-C by 30% - 49%
(Class I)

Risk discussion:
Initiate statin to reduce LDL-C ≥50%
(Class I)

If risk decision is uncertain:
Consider measuring CAC in selected adults:
CAC = zero (lowers risk; consider no statin, unless diabetes, family history of premature CHD, or cigarette smoking are present)
CAC = 1-99 favors statin (especially after age 55)
CAC = 100+ and/or ≥75th percentile, initiate statin therapy



Clinical ASCVD

Healthy Lifestyle

ASCVD not at very high-risk*

Very high-risk* ASCVD

Age ≤75 yrs

Age >75

High-intensity or maximal statin
(Class I)

High-intensity statin
(Goal:↓ LDL-C ≥50%)
(Class I)

If high-intensity statin not tolerated, use moderate-intensity statin
(Class I)

If on maximal statin & LDL-C ≥70 mg/dL (≥1.8 mmol/L), adding ezetimibe may be reasonable
(Class IIb)

Initiation of moderate or high-intensity statin is reasonable
(Class IIa)

Continuation of high-intensity statin is reasonable
(Class IIa)

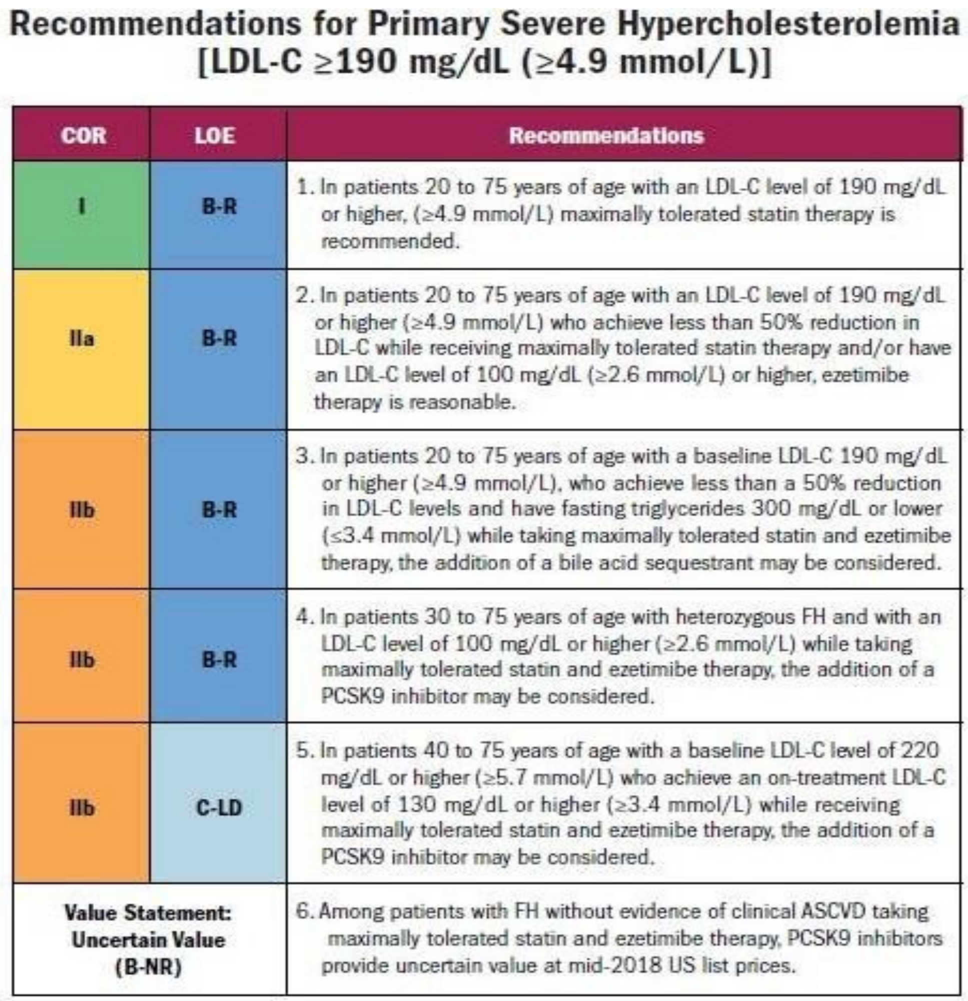
If on maximal statin & LDL-C ≥70 mg/dL (≥1.8 mmol/L), adding ezetimibe is reasonable
(Class IIa)

If PCSK9-I is considered, add ezetimibe to maximal statin before adding PCSK9-I
(Class I)

Dashed arrow indicates RCT-supported efficacy, but is less cost effective

If on clinically judged-maximal LDL-C lowering therapy & LDL-C ≥70 mg/dL (≥1.8 mmol/L), or non-HDL-C ≥100 mg/dL (≥2.6 mmol/L), adding PCSK9-I is reasonable
(Class IIa)

Recommendations for special populations



Recommendations for Primary Severe Hypercholesterolemia [LDL-C ≥190 mg/dL (≥4.9 mmol/L)]

COR	LOE	Recommendations
I	B-R	1. In patients 20 to 75 years of age with an LDL-C level of 190 mg/dL or higher, (≥4.9 mmol/L) maximally tolerated statin therapy is recommended.
IIa	B-R	2. In patients 20 to 75 years of age with an LDL-C level of 190 mg/dL or higher (≥4.9 mmol/L) who achieve less than 50% reduction in LDL-C while receiving maximally tolerated statin therapy and/or have an LDL-C level of 100 mg/dL (≥2.6 mmol/L) or higher, ezetimibe therapy is reasonable.
IIb	B-R	3. In patients 20 to 75 years of age with a baseline LDL-C 190 mg/dL or higher (≥4.9 mmol/L), who achieve less than a 50% reduction in LDL-C levels and have fasting triglycerides 300 mg/dL or lower (≤3.4 mmol/L) while taking maximally tolerated statin and ezetimibe therapy, the addition of a bile acid sequestrant may be considered.
IIb	B-R	4. In patients 30 to 75 years of age with heterozygous FH and with an LDL-C level of 100 mg/dL or higher (≥2.6 mmol/L) while taking maximally tolerated statin and ezetimibe therapy, the addition of a PCSK9 inhibitor may be considered.
IIb	C-LD	5. In patients 40 to 75 years of age with a baseline LDL-C level of 220 mg/dL or higher (≥5.7 mmol/L) who achieve an on-treatment LDL-C level of 130 mg/dL or higher (≥3.4 mmol/L) while receiving maximally tolerated statin and ezetimibe therapy, the addition of a PCSK9 inhibitor may be considered.
Value Statement: Uncertain Value (B-NR)		6. Among patients with FH without evidence of clinical ASCVD taking maximally tolerated statin and ezetimibe therapy, PCSK9 inhibitors provide uncertain value at mid-2018 US list prices.

Recommendations for Older Adults
Referenced studies that support recommendations are summarized in Online Data Supplements 18 and 19.

COR	LOE	RECOMMENDATIONS
IIb	B-R	1. In adults 75 years of age or older with an LDL-C level of 70 to 189 mg/dL (1.7 to 4.8 mmol/L), initiating a moderate-intensity statin may be reasonable (S4.4.4.1-1—S4.4.4.1-8)
IIb	B-R	2. In adults 75 years of age or older, it may be reasonable to stop statin therapy when functional decline (physical or cognitive), multimorbidity, frailty, or reduced life-expectancy limits the potential benefits of statin therapy (S4.4.4.1-9).
IIb	B-R	3. In adults 76 to 80 years of age with an LDL-C level of 70 to 189 mg/dL (1.7 to 4.8 mmol/L), it may be reasonable to measure CAC to reclassify those with a CAC score of zero to avoid statin therapy (S4.4.4.1-10, S4.4.4.1-11).

Recommendations for Patients With Diabetes Mellitus
Referenced studies that support recommendations are summarized in Online Data Supplements 11 and 12.

COR	LOE	RECOMMENDATIONS
I	A	1. In adults 40 to 75 years of age with diabetes mellitus, regardless of estimated 10-year ASCVD risk, moderate-intensity statin therapy is indicated (S4.3-1–S4.3-9).
IIa	B-NR	2. In adults 40 to 75 years of age with diabetes mellitus and an LDL-C level of 70 to 189 mg/dL (1.7 to 4.8 mmol/L), it is reasonable to assess the 10-year risk of a first ASCVD event by using the race and sex-specific PCE to help stratify ASCVD risk (S4.3-10, S4.3-11).
IIa	B-R	3. In adults with diabetes mellitus who have multiple ASCVD risk factors, it is reasonable to prescribe high-intensity statin therapy with the aim to reduce LDL-C levels by 50% or more (S4.3-12, S4.3-13).
IIa	B-NR	4. In adults older than 75 years of age with diabetes mellitus and who are already on statin therapy, it is reasonable to continue statin therapy (S4.3-5, S4.3-8, S4.3-13).
IIb	C-LD	5. In adults with diabetes mellitus and 10-year ASCVD risk of 20% or higher, it may be reasonable to add ezetimibe to maximally tolerated statin therapy to reduce LDL-C levels by 50% or more (S4.3-14, S4.3-15).
IIb	C-LD	6. In adults older than 75 years with diabetes mellitus, it may be reasonable to initiate statin therapy after a clinician-patient discussion of potential benefits and risks (S4.3-5, S4.3-8, S4.3-13).
IIb	C-LD	7. In adults 20 to 39 years of age with diabetes mellitus that is either of long duration (≥10 years of type 2 diabetes mellitus, ≥20 years of type 1 diabetes mellitus), albuminuria (≥30 mcg of albumin/mg creatinine), estimated glomerular filtration rate (eGFR) less than 60 mL/min/1.73 m^2, retinopathy, neuropathy, or ankle-brachial index (ABI; <0.9), it may be reasonable to initiate statin therapy (S4.3-5, S4.3-6, S4.3-8, S4.3-16–S4.3-25).

Dyslipidemia
MCQs

ABFM 2021

An obese 32-year-old male is admitted to the hospital with a new onset of acute pancreatitis. A lipid panel reveals a triglyceride level of 1150 mg/dL and an HDL-cholesterol level of 30 mg/dL. Other laboratory studies are normal. His 10-year risk of atherosclerotic cardiovascular disease is <5%. His family history is positive forrecurrent pancreatitis in his father and paternal grandfather. In addition to lifestyle modifications, which one of the following would be most appropriate for this patient after he is discharged?

A. Atorvastatin (Lipitor).
B. Colesevelam (Welchol).
C. Ezetimibe (Zetia).
D. Fenofibrate (Tricor).
E. Omega-3-acid ethyl esters (Lovaza).

Answer: D.

Fibrates reduce the likelihood and recurrence of pancreatitis due to severe hypertriglyceridemia when triglyceride levels are equal or more than 500 mg/dL, measured in a fasting or non-fasting state (SOR A). Thispatient's risk of atherosclerotic cardiovascular disease is <7.5% and his LDL-cholesterol level is within normalrange, so initiating a statin or ezetimibe is not indicated. Colesevelam may be used to reduce LDL-cholesteroland glucose levels but is not considered a first-line treatment. Omega-3-acid ethyl esters will reduce the triglyceride levels but this patient has severe hypertriglyceridemia, so fibrate therapy is recommended to prevent recurrent pancreatitis.

A 42-year-old transgender male comes to your office for a routine health maintenance. The patient's currentmedications include testosterone enanthate 100 mg subcutaneously every 7 days, for gender affirmation, and medroxyprogesterone acetate (Depo-subQ Provera 104), 104 mg subcutaneously every 12 weeks, for contraception. The patient has no current chronic health conditions and no current sexual partners, but he has previously been sexually active with men and women. Which one of the following health conditions is more likely to occur in this patient compared to a female cisgender patient?

A. Anemia.
B. Cervical cancer.
C. Dyslipidemia.
D. Kidney disease.
E. Venous thromboembolism.

ANSWER: C

Transgender describes persons whose experienced or expressed gender differs from their sex assigned at birth. In the United States approximately 150,000 youth and 1.4 million adults identify as transgender, though many believe these numbers underestimate the actual prevalence. Transgender men who take testosterone may experience increased muscle mass and decreased fat mass, male pattern baldness, increased sexual desire, clitoromegaly, decreased fertility, deepening of the voice, cessation of menses, acne, and a significant increase in body hair, particularly on the face, chest, and abdomen. Risks of testosterone therapy include more atherogenic lipid profiles, an increase in blood pressure, and erythrocytosis (rather than anemia). Severe liver dysfunction is unusual at therapeutic dosages but is a concern at dosages above the recommended therapeutic range. Testosterone therapy has not been associated with cervical cancer, kidney disease, or venous thromboembolism (VTE). Estrogen-based therapies for male-to-female transgender patients do carry an increased risk for VTE. It is not clear whether increased blood pressure and dyslipidemia in these patients translates into an increase in cardiovascular events. Even so, when identified, treatment such as antihypertensive drugs and statins to address these riskfactors is recommended as for any other patient.

A 45-year-old female with a 4-year history of type 2 diabetes is taking only metformin (Glucophage) and maintaining a hemoglobin A1c of 6.6%. Her LDL-cholesterol level is 94 mg/dL. She has no complications related to diabetes and her medical history is otherwise unremarkable. Which one of the following should be added to her current medication regimen?

A. A DPP-4 inhibitor.
B. An SGLT2 inhibitor.
C. A low-intensity statin.
D. A moderate-intensity statin.
E. A high-intensity statin.

Answer: D.

All patients between 40 and 75 years of age with diabetes mellitus and an LDL-cholesterol level 70 mg/dL should begin taking a moderate-intensity statin. It is not necessary to calculate a 10-year risk for atherosclerotic cardiovascular disease because the results do not alter the recommendation. This patient’s HbA1c is <7%, which is acceptable, and she does not need additional hypoglycemic medications. She has nodiabetes-specific risk-enhancing conditions such as a long duration of illness, chronic kidney disease, retinopathy, neuropathy, or an ankle-brachial index <0.9. Older age and risk-enhancing conditions may require increasing the statin to high-intensity dosages. A DPP-4 inhibitor, an SGLT2 inhibitor, and a low- intensity statin would not be appropriate for this patient at this time.

A 55-year-old male presents to your office to establish care. He has a history of hypertension, hypercholesterolemia, and coronary artery disease. He had a non-ST-elevation myocardial infarction (NSTEMI) 3 years ago. An echocardiogram at that time was normal and he received a single drug-eluting stent. He has not seen a cardiologist since then and would prefer not to see one unless it is necessary, due to his high insurance copayments for specialist visits. His current medications include clopidogrel (Plavix), aspirin, atorvastatin (Lipitor), lisinopril (Prinivil, Zestril), and carvedilol (Coreg). A review of systems is negative. His vital signs include a blood pressure of 120/72 mm Hg, a heart rate of 80 beats/min, and a respiratory rate of 12/min. A physical examination is unremarkable, a basic metabolic panel is normal, and his hemoglobin A1c is 5.7%. His LDL-cholesterol level is 60 mg/dL, his HDL-cholesterol level is 49 mg/dL, andhis total cholesterol level is 147 mg/dL. The patient would like to reduce the number of medications he takesbecause of the cost. Which one of the following medications in his current regimen would be mostappropriate to discontinue at this time?

A. Aspirin.
B. Atorvastatin.
C. Carvedilol.
D. Clopidogrel.
E. None of his current medications.

Answer: D.

In adult patients with stable coronary artery disease, continued control of blood pressure and cholesterol is paramount. Based on American College of Cardiology/American Heart Association guidelines, it would be reasonable for this patient to stop dual antiplatelet therapy at this time by discontinuing clopidogrel. Aspirin should be continued and is the most cost-effective option for antiplatelet therapy. This patient's LDL-cholesterol level is at goal, so atorvastatin should be continued. He has reached his blood pressure goal of <130/80 mm Hg and has no orthostatic symptoms, so his current blood pressure medication regimen shouldbe continued.

A 12-year-old male with type 1 diabetes is brought to your office for routine follow-up. Laboratory work performed prior to the appointment shows an LDL-cholesterol level of 120 mg/dL. In addition to counselingthe patient on a heart-healthy diet and daily physical activity, which one of the following would you recommend?

A. No additional measures.
B. Fish oil supplements.
C. Atorvastatin (Lipitor).
D. Ezetimibe (Zetia).
E. Gemfibrozil (Lopid).

Answer: C.

Pediatric type 1 diabetes is recognized as a high-risk condition for the future development of cardiovascular disease. Current guidelines recommend initiating a statin, in addition to education regarding a healthy diet and physical activity, for pediatric patients in this high-risk category with an LDL-cholesterol level >100 mg/dL. Statins such as atorvastatin are recommended for first-line treatment according to multiple studies that demonstrate their efficacy and benefits in reduction of cardiovascular morbidity and mortality, along with long-term studies demonstrating their safety. Fish oil supplements, ezetimibe, and gemfibrozil would not be appropriate recommendations for this patient at this time.

Which one of the following represents a CONTRAINDICATION to statin use?

A. Current pregnancy.
B. Chronic hepatitis C infection.
C. End-stage renal disease.

D. Myositis associated with a creatine kinase level five times the upper limit of normal.
E. Transaminitis due to nonalcoholic steatohepatitis.

Answer: A.

Statins have been associated with fetal anomalies and are contraindicated during pregnancy and not recommended during breastfeeding. With appropriate monitoring, statins may be used in patients with chronic hepatitis C infection, end-stage renal disease, and transaminitis due to nonalcoholic fatty liver disease (including nonalcoholic steatohepatitis). Statins also may be continued in the setting of myositis witha creatine kinase up to 10 times the upper limit of normal, provided that the muscle related symptoms are tolerable to the patient.

ABFM 2020

A 38-year-old male comes to your office for follow-up of his diabetes mellitus. She takes metformin (Glucophage) and dulaglutide (Trulicity) and his hemoglobinA1c is 6.5%. He has an LDL-cholesterol level of 120 mg/dL, an HDL-cholesterol level of 55 mg/dL, and a triglyceride level of 190mg/dL. He asks your advice about statin therapy for cholesterol management. You advise him to start:

A. A low-intensity statin now.
B. A moderate-intensity statin now.
C. Statin therapy at 40 years of age.
D. Statin therapy when his 10-year atherosclerotic cardiovascular disease (ASCVD) risk is >5%.
E. Statin therapy when his 10-year ASCVD risk is >7.5%.

Answer: C.

There is high-quality evidence from randomized, controlled trials that a moderate-intensity statin should beinitiated for all patients age 40–75 years with diabetes mellitus regardless of their calculated 10-year atherosclerotic cardiovascular disease (ASCVD) risk. There is no strong evidence supporting the use of statinsbefore age 40 in patients with diabetes unless their LDL-cholesterol level is very high. The ASCVD risk score is valid for patients over 40 years of age and cannot be calculated before then.

ABFM 2019

A 70-year-old male presents to your office for follow-up after he was hospitalized for acute coronary syndrome. He has not experienced any pain since discharge and is currently in a supervised cardiac rehabilitation exercise program. His medications include aspirin, lisinopril (Prinivil, Zestril), and metoprolol, but he was unable to tolerate atorvastatin (Lipitor), 40 mg daily, because he developed muscle aches. Whichone of the following would you recommend?

A. Evolocumab (Repatha).
B. Ezetimibe/simvastatin (Vytorin).
C. Fenofibrate (Tricor).
D. Niacin.

E. Omega-3 fatty acid supplements.

Answer: B.

High-intensity statin therapy is recommended for patients younger than 75 years of age with known coronaryartery disease. For those who are intolerant of high-intensity statins, a trial of a moderate intensity statin isappropriate. There is evidence to support ezetimibe plus a statin in patients with acute coronary syndrome or chronic kidney disease. Omega-3 fatty acids, fibrates, and niacin should not be prescribed for primary or secondary prevention of atherosclerotic cardiovascular disease because they do not affect patient-orientedoutcomes. PCSK9 inhibitors such as evolocumab are injectable monoclonal antibodies that lower LDL- cholesterol levels significantly and have produced some promising results, but more studies are needed to determine when this would be cost effective.

An 80-year-old former smoker sees you for a 6-month follow-up for hypertension. He is taking carvedilol (Coreg), amlodipine (Norvasc), and low-dose aspirin. His home blood pressure readings have been 130–150/80–90 mm Hg. Over the last 4 months he has developed pain in his thighs when walking to his mailbox a block away. The pain resolves after he sits for a few minutes. On examination he has a blood pressure of 135/85 mm Hg, a heart rate of 72 beats/min, a BMI of 26 kg/m2 and an oxygen saturation of 95% on room air. Examinations of the heart and lungs are normal. There is dependent rubor of both legs but posterior tibial pulses are palpable. No ulcerations are noted. You obtain ankle-brachial indices of 0.85 on the left and
0.80 on the right. You prescribe a daily walking program. Which one of the following additional measures would be most appropriate for this patient?

A. Add atorvastatin (Lipitor).
B. Add clopidogrel (Plavix).
C. Add lisinopril (Prinivil, Zestril) to achieve a goal blood pressure <120/80 mm Hg.
D. Discontinue aspirin and start warfarin (Coumadin).
E. Refer to a vascular surgeon.

Answer: A.

Management of asymptomatic peripheral artery disease (PAD) should initially be conservative and should include a walking program (SOR A), smoking cessation, and a healthy diet. Statins should be started for all patients with PAD regardless of their LDL-cholesterol levels (SOR A). High-intensity statins should be used iftolerated. A single antiplatelet agent is recommended for patients with PAD. Both aspirin and clopidogrel are effective in the reduction of stroke, but the combination of the two is recommended only afterrevascularization surgery.

FM-Pretest

You are doing a screening physical examination for a 40-year-old female patient. She does not have diabetes or known coronary artery disease. You calculate her 10-year Atherosclerotic Cardiovascular Disease (ASCVD)risk to be 6.5%. Her low-density lipoprotein (LDL) cholesterol is 165 mg/dL, high-density lipoprotein (HDL) cholesterol is 48 mg/dL, and triglycerides are 193 mg/dL. Given this information, what do you recommend as treatment for her dyslipidemia?

A. Lifestyle modifications such as diet and physical activity.
B. Treatment with a low-intensity statin.
C. Treatment with a moderate-intensity statin.
D. Treatment with a high-intensity statin.

Answer: A.

Recent guidelines describe four groups of patients who benefit from statin therapy for ASCVD prevention: (1) patients with clinical ASCVD, such as coronary artery disease, stroke, transient ischemic attack (TIA), or peripheral artery disease (PAD) (2) patients with primary elevations of LDL-C more than or equal to 190 md/dL (3) patients aged 40 to 75 with diabetes and LDL-C between 70 and 189 mg/dL and without clinical ASCVD (4) patients without clinical ASCVD or diabetes with an LDL-C between 70 and 189 mg/dL AND an estimated 10-year ASCVD risk more than or equal to 7.5%. Recommendations regarding intensity of statin level are based on these groups, but this patient does not benefit from statin therapy at this time. Lifestyle modifications are recommended as the mainstay of all prevention efforts for patients with dyslipidemias orrisk factors for ASCVD.

You are caring for a newly established 54-year-old white male patient with T2DM, hypertension, anddyslipidemia. He does not have any clinical ASCVD, but his father died from a MI at the age of 56. He admits he has not been great about following up with a physician and would like to make a greater effort to controlhis cardiac risks. His blood pressure is well controlled with lisinopril-hydrochlorothiazide. He has never smoked. His 10- year ASCVD risk is calculated at 11.2%. His recent laboratory values are below. What treatment recommendation do you suggest for his dyslipidemia?

A. Lifestyle modifications such as diet and physical activity.
B. Treatment with a low-intensity statin.
C. Treatment with a moderate-intensity statin.
D. Treatment with a high-intensity statin.
E. Treatment with a fenofibrate agent.

Answer: D.

According to the ACC/AHA blood cholesterol guidelines, for the prevention of ASCVD events this patient should receive a high-intensity statin based on his risk factors. Patients with clinical ASCVD, patients with diabetes and 10-year ASCVD risk more than or equal to 7.5%, and patients with an LDL-C more than or equalto 190 mg/dL benefit from a high-intensity statin. Patients 40 to 75 years old with diabetes and an LDL-C between 70 and 189 mg/dL or patients 40 to 75 years old with a 10-year ASCVD risk more than or equal to 7.5%, and those with clinical ASCVD who are more than 75 years old or cannot tolerate a high intensity statinreceive benefit from a moderate-intensity statin. While his triglycerides are elevated, treating them with a fenofibrate agent would not be expected to improve his health outcome. Use of a high-intensity statin will be likely to lower this patient’s LDL-C by approximately 50%.

You are caring for a 26-year-old man with dyslipidemia and a family history of early coronary arterial disease.Laboratory analysis reveals a low HDL. Which of the following interventions, if adopted by the patient, wouldraise his HDL levels to the greatest extent?

A. Eat oat bran.
B. Lose weight.
C. Start exercising.
D. Quit smoking.
E. Reduce life stress.

Answer: C.
Several lifestyle modification efforts are known to increase HDL cholesterol. By losing weight, a person can expect to raise HDL by 5 to 10 points. Smoking cessation has the same approximate effect. Adopting an exercise program is even more effective, raising HDL by up to 15 points. Eating oat bran and decreasing life stress can lower LDL, but is not likely to raise HDL. Additionally, alcohol, in moderation, raises HDL cholesterol.

You have performed a screening lipid profile on an otherwise healthy man. His results indicate elevated triglycerides, a low HDL, a high LDL, an elevated total cholesterol, and an elevated very-low-density lipoprotein (VLDL). You would like to rescreen him in the fasting state. Which of the following laboratory values is likely to decrease in the fasting state?

A. Serum triglycerides.
B. HDL.
C. LDL.
D. Total cholesterol.
E. VLDL.

Answer: A.
Blood lipids change acutely in response to food intake. The triglyceride level is lowest in the fasting state andrises by an average of 50 mg/dL postprandially. As the triglyceride level rises, the total and LDL cholesterol each fall. Thus, total and LDL cholesterol tend to be higher when fasting. HDL varies little whether fasting ornot.

You have been caring for a 36-year-old man and identified that he meets criteria for therapeutic lifestyle changes (TLC) to improve his lipid profile. After 4 months of adhering to your recommendations, his LDL is still higher than goal. Which of the following drug classes should be initiated?

A. A statin.
B. A bile acid sequestrant.
C. Nicotinic acid.
D. A fibrate.
E. A cholesterol absorption inhibitor.

Answer: A.

sThe National Cholesterol Education Program ATP III guidelines recommend that medications should be added to TLC after 3 months if LDL goals are not achieved, even in lower risk patients. Given their track record, statin agents are the drugs of first choice.

You started a 43-year-old female patient of yours on a statin for dyslipidemia. She has no other medical conditions, but does have a family history of coronary heart disease. At a follow-up visit for a different chief complaint, you order a laboratory panel that includes serum transaminases. Her AST is found to be 56 U/L (normal is 10-40 U/L) and her ALT is found to be 115 U/L (normal is 7-56 U/L). Which of the following is most appropriate given these values?

A. Discontinue the statin.
B. Decrease the dose of the statin.
C. Test muscle enzymes (creatine phosphokinase [CPK]) and discontinue the statin if also elevated.
D. Test muscle enzymes (CPK) and decrease the dose of the statin if also elevated.
E. No change is indicated.

Answer: E.

The primary side effects seen with statin agents include myopathy and increased liver enzymes. Rhabdomyolysis occurs in less than 0.1% of cases, but elevated transaminases occur more commonly. Discontinuation of the agent is required only if liver enzymes increase to more than 3 times normal (and thatoccurs in only 1% of patients on statins). Routine monitoring of serum aminotransferase levels is no longer recommended by the FDA since hepatic side effects will most often trigger an evaluation, and the effects are reversible. Routine monitoring of muscle enzymes is not supported by evidence, but unexplained pain in large muscle groups should prompt an investigation for myopathy.

You have prescribed niacin for a patient with VLDL cholesterol and elevated triglycerides. He reports nonadherence to this regimen because of significant flushing that occurs when he takes the medication. What would you recommend to avoid this side effect?

A. Take the niacin at night.
B. Take the niacin with food.
C. Take the niacin with milk.
D. Take aspirin before taking the niacin.
E. Take a proton-pump inhibitor before taking the niacin.

Answer: D.

Niacin is associated with a prostaglandin-mediated flushing effect. Aspirin (81-325 mg) blocks much of the flushing that is associated with sustained-release niacin preparations. Taking niacin at night, with food, on an empty stomach or with milk, or with a proton-pump inhibitor will not impact the side effects. Initiating niacin at a low dose (100 mg daily) and slowly titrating up can also decrease flushing. Only 50% to 60% of patients can tolerate the full-dose of Niacin; extended-release dosing is better tolerated.

You are treating a patient who is interested in more "natural" methods to control his cholesterol. He wants to use niacin. Which of the following statements regarding niacin is true?

A. It substantially decreases LDL.
B. It substantially raises HDL.
C. It has no effect on triglycerides.
D. Its side effects generally prevent it from being used.
E. It can't be used in patients who have concurrent diabetes.

Answer: B.
Niacin was the first lipid-lowering agent associated with decreased total mortality. It moderately decreases LDL, can increase HDL by 20% to 25%, and moderately decreases triglycerides. It causes a prostaglandin-mediated flushing that patients often describe as "hot flashes." This side effect can be easily moderated by having the patient take an NSAID or aspirin at least an hour before taking the niacin. Although niacin can increase blood sugar, it is safe for diabetics to use.

You are treating a patient with dyslipidemia and clinical ASCVD. She has elevated total cholesterol, LDL-C, and triglycerides. Her HDL is low. Which of the following changes will have the greatest effect on mortality?

A. Increasing HDL.
B. Decreasing LDL-C.
C. Decreasing triglycerides.
D. Decreasing non-HDL cholesterol.
E. Decreasing apolipoprotein-A.

Answer: B.
Numerous studies have demonstrated the benefits of lowering LDL-C on all-cause and cardiovascular mortality. Non-HDL cholesterol is the sum of HDL and VLDL cholesterol; while reductions in VLDL are considered beneficial, there are no studies evaluating its effect on mortality. Niacin increases HDL and lowersVLDL and has been shown to reduce cardiovascular events and mortality, but not to the extent that loweringLDL does. Additionally, raising HDL doesn't seem to have an added benefit to lowering LDL cholesterol. Apolipoprotein A is protective against CVD and lowering it would negatively affect outcomes. The effect of lowering triglycerides is not well understood; studies have shown higher risks of CVD in patients with elevated triglycerides. However, the current data do not support lowering triglycerides for CVD prevention.

Midyear Exam

A 58-year-old smoker man has history of hypertension and asks about reducing his risk for myocardial infarction. A lipid Profile shows low HDL cholesterol at 32 mg/dl (normal >60 mg/dl). Which of the following is an important recommendation in attempting to raise the HDL?

A. Aspirin, 325 mg each day.
B. VitaminE,400 units each day.
C. Exercise and smoking cessation.
D. DHEA (dehydroepiandrosterone) supplementation.

Answer: C.
Exercise has the highest effect on increasing HDL.

A 48-year-old man with no significant medical history and no symptoms is found to have elevated cholesterol at a health screening. Which of the following tests is part of the routine evaluation of this problem?

A. ECG.
B. Stress test.
C. Complete blood count (CBC).
D. Thyroid-stimulating hormone (TSH).

Answer: D.
All patients newly diagnosed with dyslipidemia or when a component of the lipid profile has inexplicably changed for the worse should have the following labs ordered to rule out causes of secondary dyslipidemia:

- Creatinine
- Fasting glucose
- Liver enzymes
- Thyroid-stimulating hormone (TSH)
- Urinary protein

A patient known to have diabetes and stable angina on beta blocker and aspirin presented for check-up. His lab test shows elevated lipid profile. What should you prescribe?

A. Atorvastatin 10 mg.
B. Rosuvastatin 20 mg.
C. Simvastatin 20 mg.
D. Fibrate 200.

Answer: B.

Since the patient has established ASCVD, secondary prevention with high intensity statin should be given.

A 22-year-old male with a family history of dyslipidemia came for a check-up. His lab tests show:
Triglycerides: 900 mg/dL
LDL: 156 mg/dL
HDL: 48 mg/dL
What to do next?

A. Fenofibrate 200 mg.
B. Atorvastatin + ezetimibe.
C. Atorvastatin.
D. Healthy Diet and exercise.

Answer: A.
Patients with triglyceride above 886 mg/dL (10 mmol/L), the start of fenofibrate is suggested.

ABFM 2015-2018

A 45-year-old male with no known medical problems sees you for a general physical examination. Which oneof the following screening measures is recommended by the U.S. Preventive Services Task Force for this patient?

A. A fasting lipid profile.
B. Colorectal cancer screening.
C. Abdominal aortic aneurysm screening.
D. Testicular examination.
E. Prostate-specific antigen.

Answer: A.
The U.S. Preventive Services Task Force recommends that all men 35 years of age and older be screened fordyslipidemia (evidence rating A). Men who are 20–35 years of age should be screened only if they have cardiovascular risk factors (evidence rating B). Prostate-specific antigen (PSA) testing should not be performed at any age because the harms outweigh the benefits (evidence rating D). Colorectal cancer screening should begin at age 50 for men of average risk (evidence rating A). Abdominal aortic aneurysm (AAA) screening once by ultrasonography is recommended for men age 65–75 with a family history of AAA, and for those who have smoked at least 100 cigarettes in their lifetime (evidence rating B). Testicular examinations, either by self-examination or clinical screening, should not be performed routinely (evidencerating D).

You see a 45-year-old white male smoker for follow-up of his hypertension. His past medical history is otherwise unremarkable. At this visit he has a blood pressure of 136/84 mm Hg. A lipid panel reveals the

following:
Triglycerides .... 226 mg/dL
Total cholesterol .... 228 mg/dL
LDL-cholesterol ....159 mg/dL
HDL-cholesterol .... 31 mg/dL

The ASCVD Risk Estimator yields a 10-year atherosclerotic cardiovascular disease risk of 15.4%. Based on the 2013 American College of Cardiology/American Heart Association guideline for reducing atherosclerotic cardiovascular disease risk in adults, which one of the following is the most appropriate medication regimen for this patient?

A. Moderate- or high-intensity statin therapy.
B. Statin therapy titrated to reduce LDL-cholesterol by 20%–30%.
C. Combined statin and fibrate therapy to reduce both LDL-cholesterol and triglycerides.
D. Combined statin and niacin therapy to reduce LDL-cholesterol and raise HDL-cholesterol.
E. Combined statin and PCSK9 inhibitor therapy to reduce the LDL-cholesterol level to <70 mg/dL.

Answer: A.

The 2013 American College of Cardiology/American Heart Association guideline for reducing atheroscleroticcardiovascular disease (ASCVD) risk in adults recommended several significant changes in the managementof hyperlipidemia. This guideline recommends looking at overall risk as estimated by a tool, the ASCVD RiskEstimator, which considers not only lipid parameters but also age, sex, ethnicity, systolic blood pressure, andthe presence or absence of diabetes mellitus, treated hypertension, and smoking. Four major risk groups were identified for treatment, one of which was adults ≥40 years of age with an estimated 10-year risk of ASCVD ≥7.5%. Therapy is graded by intensity (low-, moderate-, or high-intensity statin therapy), andtherapeutic targets for LDL-cholesterol were abandoned since there is no demonstrable benefit from achieving a certain level of LDL-cholesterol in treated patients. This patient has an estimated 10-year ASCVDrisk well above 7.5% and is a candidate for moderate- or high-intensity statin therapy under the guideline. Niacin and fibrate therapy do not have a demonstrable impact on cardiovascular outcomes and are not recommended in the guideline. PCSK9 inhibitors are also not yet recommended in any guideline.

A 45-year-old male with hyperlipidemia presents to your office for follow-up. Because of his cardiovascular risk level he has been on moderate-intensity statin therapy with atorvastatin (Lipitor) for the past 6 months. His HDL-cholesterol level at this visit is 29 mg/dL. Which one of the following steps is most appropriate?

A. Continue the statin.
B. Add fibrates.
C. Add niacin.
D. Supplement with fish oil.

Answer: A.

Drug therapy aimed at increasing HDL-cholesterol levels when added to a statin treatment does not decreasea patient's cardiovascular risk. Such agents have no effect on all-cause mortality, cardiovascular mortality, or the risk of stroke (SOR B). Current guidelines for treatment of hyperlipidemia are based on individual cardiovascular risk stratification rather than LDL-cholesterol levels, and recommend low-, medium-, or high-intensity therapy with statins, based on an individual patient's risk.

A 40-year-old African American female brings you her lipid panel results from a work health fair and asks if she should start taking medication to lower her cholesterol. The results include a total cholesterol level of 295 mg/dL, an LDL-cholesterol level of 170 mg/dL, an HDL-cholesterol level of 42 mg/dL, and a triglyceride level of 200 mg/dL. The patient does not smoke and except for a BMI of 30.4 kg/m2 she is otherwise healthy.Her blood pressure is 132/76 mm Hg and she takes no medications. Which one of the following would be consistent with current guidelines?

A. Initiating treatment with red yeast rice supplements.
B. Initiating treatment with a statin medication only if she has a cardiovascular event or developsdiabetes mellitus.
C. Initiating treatment based on her calculated risk of a cardiovascular event in the next 10 years.
D. Initiating treatment with a statin based on her current LDL-cholesterol level.

Answer: C.
The 2013 American College of Cardiology/American Heart Association cholesterol guideline suggests statin therapy for individuals with an estimated 10-year risk of atherosclerotic cardiovascular disease of 7.5% or greater. The U.S. Preventive Services Task Force and the National Institute for Health and Care Excellence recommend statin therapy when the patient's 10-year risk of cardiovascular disease is 10% or greater. While international guidelines differ somewhat, other major guidelines would support similar recommendations.

A healthy 55-year-old white male with a family history of coronary artery disease sees you for a routine health maintenance visit. He asks you what he could do to decrease his risk of cardiovascular disease. He is a nonsmoker, does not drink alcohol, and has no history of substance abuse. His BMI is normal and the physical examination is otherwise unremarkable. His vital signs include a heart rate of 80 beats/min, a blood pressure of 119/70 mm Hg, a respiratory rate of 15/min, and a temperature of 37.0 C (98.6 F).
Laboratory Findings
Fasting glucose 92
mg/dL
Total cholesterol 190
mg/dLLDL-cholesterol 98
mg/dL
HDL-cholesterol 50 mg/dL
Triglycerides 145 mg/dL
His calculated 10-year risk for cardiovascular disease is 5.4%. Which one of the following has the best evidence to prevent cardiovascular disease in a patient such as this?

A. Moderate-intensity exercise, 150 minutes weekly.
B. A low-dose statin.
C. Aspirin, 81 mg daily.

D. Fish oil supplements.
E. Niacin supplements.

Answer: A.

A systematic evidence review released by the U.S. Preventive Services Task Force (USPSTF) noted that the most active people had median cardiovascular risk reductions of about 30%–35% when compared with the least active. Statins are beneficial for both primary and secondary prevention of cardiovascular disease, butthe benefit is greater when the baseline risk is greater. Current guidelines would not support statin therapyfor a patient with a 10-year risk of atherosclerotic cardiovascular disease (ASCVD) <5%. Fish oil supplementshave not proven to be useful for primary prevention of ASCVD. Aspirin is recommended for the prevention of cardiovascular disease in adults 50–59 years of age with a >10% 10- year ASCVD risk who are not at increased risk of bleeding, are expected to live at least 10 years, and are willing to take low-dose daily aspirinfor 10 years (USPSTF B recommendation). Niacin is no longer recommended for cardiovascular risk reductiondue to a lack of evidence for benefit.

A 68-year-old female sees you for a routine health maintenance visit. She feels well and says she has been eating more carefully and exercising for 45 minutes 4 days a week for the past 6 months. Her past medical history includes controlled hypertension and osteoarthritis of the knee. Her family history is notable for a myocardial infarction in her mother at 48 years of age. Her only medication is lisinopril (Prinivil, Zestril). Thephysical examination is notable only for a BMI of 36.0 kg/m2. Laboratory findings are notable for significant hyperlipidemia and you recommend starting a statin. She reports that she will undergo an elective total kneereplacement next month and asks about the safety of starting a new medication before this surgery. You recommend that she:

A. start a statin immediately to decrease her risk of cardiovascular disease and perioperative mortality.
B. start a statin immediately to decrease her risk of cardiovascular disease, although her risk of perioperative mortality will not be affected.
C. start a statin immediately to decrease her risk of cardiovascular disease, stop the statin 1 week beforesurgery, and resume taking it after the surgery, to decrease her risk of perioperative mortality.
D. start a statin immediately after the surgery to decrease her risk of cardiovascular disease andperioperative mortality.
E. start a statin after she is released postoperatively by her surgeon to decrease her risk of cardiovascular disease and perioperative mortality.

Answer: A.

Family physicians are often consulted for perioperative medical management. Studies have shown decreased perioperative mortality in patients who continue statins and in patients with clinical indications for statin therapy who start statins prior to undergoing vascular or high-risk surgeries such as joint replacement. A meta-analysis of 223,000 patients showed a significant reduction in perioperative mortality in patients receiving statin therapy versus placebo who underwent noncardiac surgical procedures. This patient has a clinical indication (multiple risk factors) to start statin therapy now.

Part 1 - 2019

A 67-year-old female presented for routine investigation. She was asymptomatic and her vital signs were within normal range except for BP 126/88.
Labs: cholesterol: LDL 2.3, HDL 1.9
Which of the following is considered a positive risk factor for developing heart disease?

A. Female gender.
B. Diastolic blood pressure >80.
C. Cholesterol.
D. Age >65.

Answer: D.

Coronary Heart Disease Risk Based on Risk Factors Other Than the LDL Level.

Positive risk factors

- Male ≥45 years.
- Female ≥55 years or postmenopausal without estrogen replacement therapy.
- Family history of premature coronary heart disease (definite myocardial infarction or sudden death before age 55 in father or other male first-degree relative or before age 65 in mother or other female first-degree relative).
- Current cigarette smoking.
- Hypertension (blood pressure ≥140/90 mm Hg or patient is receiving antihypertensive drug

Geriatrics

Collected by: Faris AlOwin R2
Editing and final revision: Nuha Almasoud R3

Geriatrics

Dementia

Dementia (or major neurodegenerative disorder in DSM5) is a disorder that is characterized by a decline in cognition affecting one or more cognitive domains (learning and memory, language, executive function, complex attention, perceptual motor, social cognition). (See Table)

- Mild cognitive impairment (MCI) is defined as an intermediate clinical state lying between normal cognition and dementia. Overall function (ADLs= activities of daily living) is not impaired in MCI compared to dementia.

Cognitive Domain	Symptoms (Example)
Complex attention	Difficulty completing mental math calculation, remembering a phone number
Executive function	Difficulty completing activities, or task because of easy distractibility
Language	Difficulty finding the correct words and mispronunciation
Learning and memory	Forgetting to pay bills, repetition in conversation
Perceptual-Motor	Difficulty in using familiar technology of kitchen appliances
Social cognition	Apathy, loss of empathy

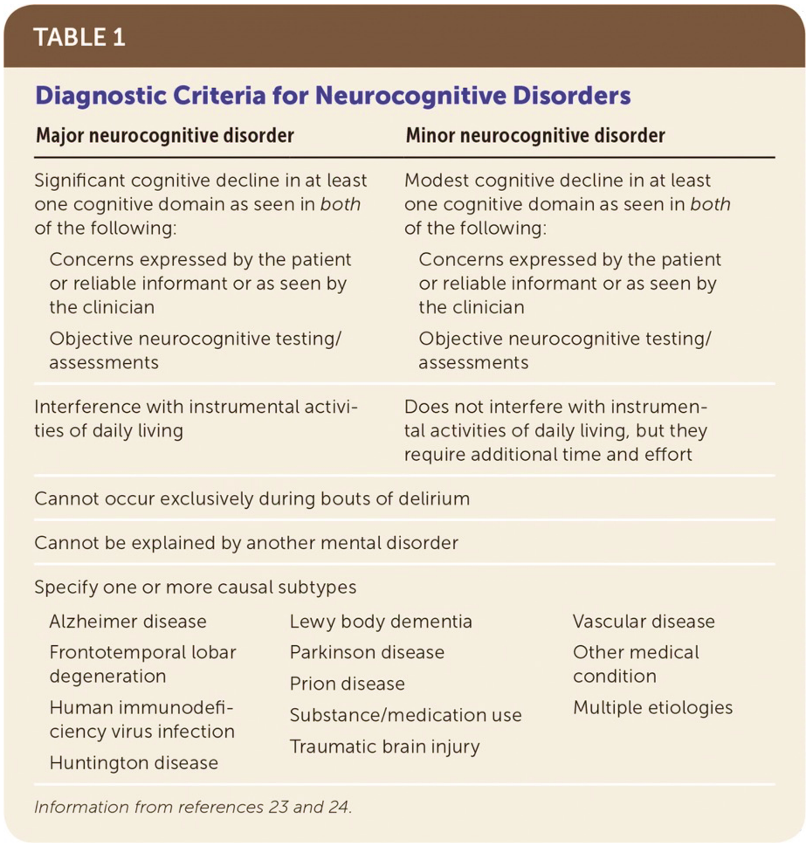


TABLE 1

Diagnostic Criteria for Neurocognitive Disorders

Major neurocognitive disorder	Minor neurocognitive disorder
Significant cognitive decline in at least one cognitive domain as seen in *both* of the following: Concerns expressed by the patient or reliable informant or as seen by the clinician Objective neurocognitive testing/ assessments	Modest cognitive decline in at least one cognitive domain as seen in *both* of the following: Concerns expressed by the patient or reliable informant or as seen by the clinician Objective neurocognitive testing/ assessments
Interference with instrumental activities of daily living	Does not interfere with instrumental activities of daily living, but they require additional time and effort
Cannot occur exclusively during bouts of delirium	
Cannot be explained by another mental disorder	

Specify one or more causal subtypes

- Alzheimer disease
- Frontotemporal lobar degeneration
- Human immunodeficiency virus infection
- Huntington disease
- Lewy body dementia
- Parkinson disease
- Prion disease
- Substance/medication use
- Traumatic brain injury
- Vascular disease
- Other medical condition
- Multiple etiologies

Information from references 23 and 24.

Differential diagnosis of Dementia:

1. **Alzheimer:**
    - The most common cause (60-70%) of Dementia cases
    - Progressive downhill deterioration of intellectual functioning
    - Short-term memory impairment is early and prominent in most cases.
    - Variable deficits of executive function, visuospatial function and language.

2. **Vascular Dementia:**
    - Stepwise deterioration.
    - Onset: after stroke, uncontrolled HTN and hyperglycemia
    - Symptoms depend on localization of strokes

3. **Medical condition: (Reversible)**
    - Hypothyroidism
    - Vitamin B 12, folic deficiency

4. **Pseudo-dementia:** FAKE cognitive decline, due to depression
5. **Others: see table 3 next page**

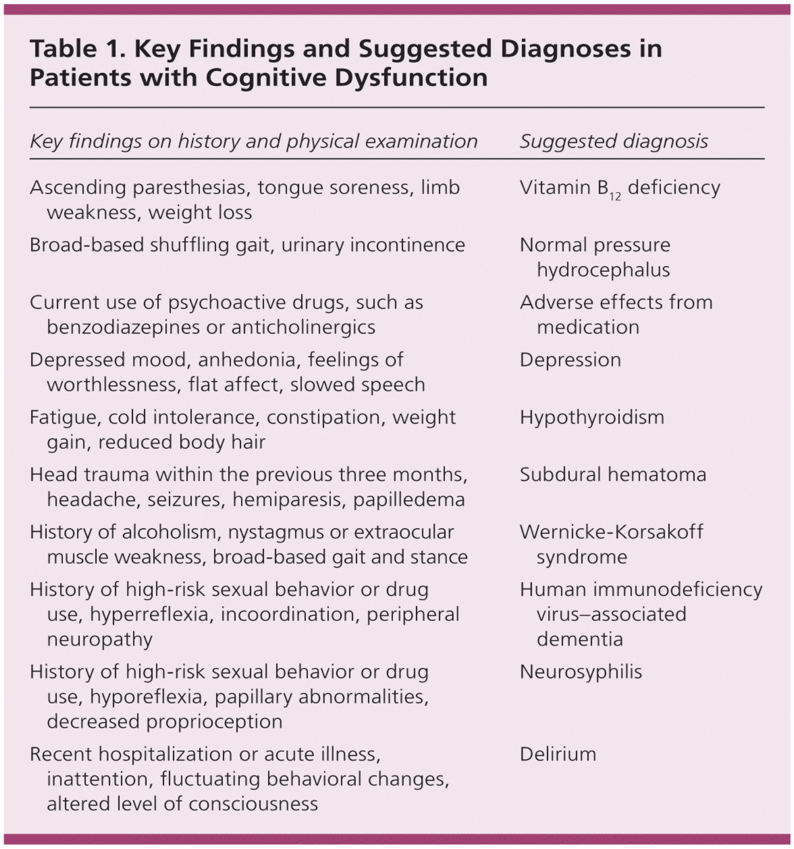


Table 1. Key Findings and Suggested Diagnoses in Patients with Cognitive Dysfunction

Key findings on history and physical examination	*Suggested diagnosis*
Ascending paresthesias, tongue soreness, limb weakness, weight loss	Vitamin B_{12} deficiency
Broad-based shuffling gait, urinary incontinence	Normal pressure hydrocephalus
Current use of psychoactive drugs, such as benzodiazepines or anticholinergics	Adverse effects from medication
Depressed mood, anhedonia, feelings of worthlessness, flat affect, slowed speech	Depression
Fatigue, cold intolerance, constipation, weight gain, reduced body hair	Hypothyroidism
Head trauma within the previous three months, headache, seizures, hemiparesis, papilledema	Subdural hematoma
History of alcoholism, nystagmus or extraocular muscle weakness, broad-based gait and stance	Wernicke-Korsakoff syndrome
History of high-risk sexual behavior or drug use, hyperreflexia, incoordination, peripheral neuropathy	Human immunodeficiency virus–associated dementia
History of high-risk sexual behavior or drug use, hyporeflexia, papillary abnormalities, decreased proprioception	Neurosyphilis
Recent hospitalization or acute illness, inattention, fluctuating behavioral changes, altered level of consciousness	Delirium

TABLE 3

Key Findings and Suggested Etiologies in Patients with Cognitive Impairment

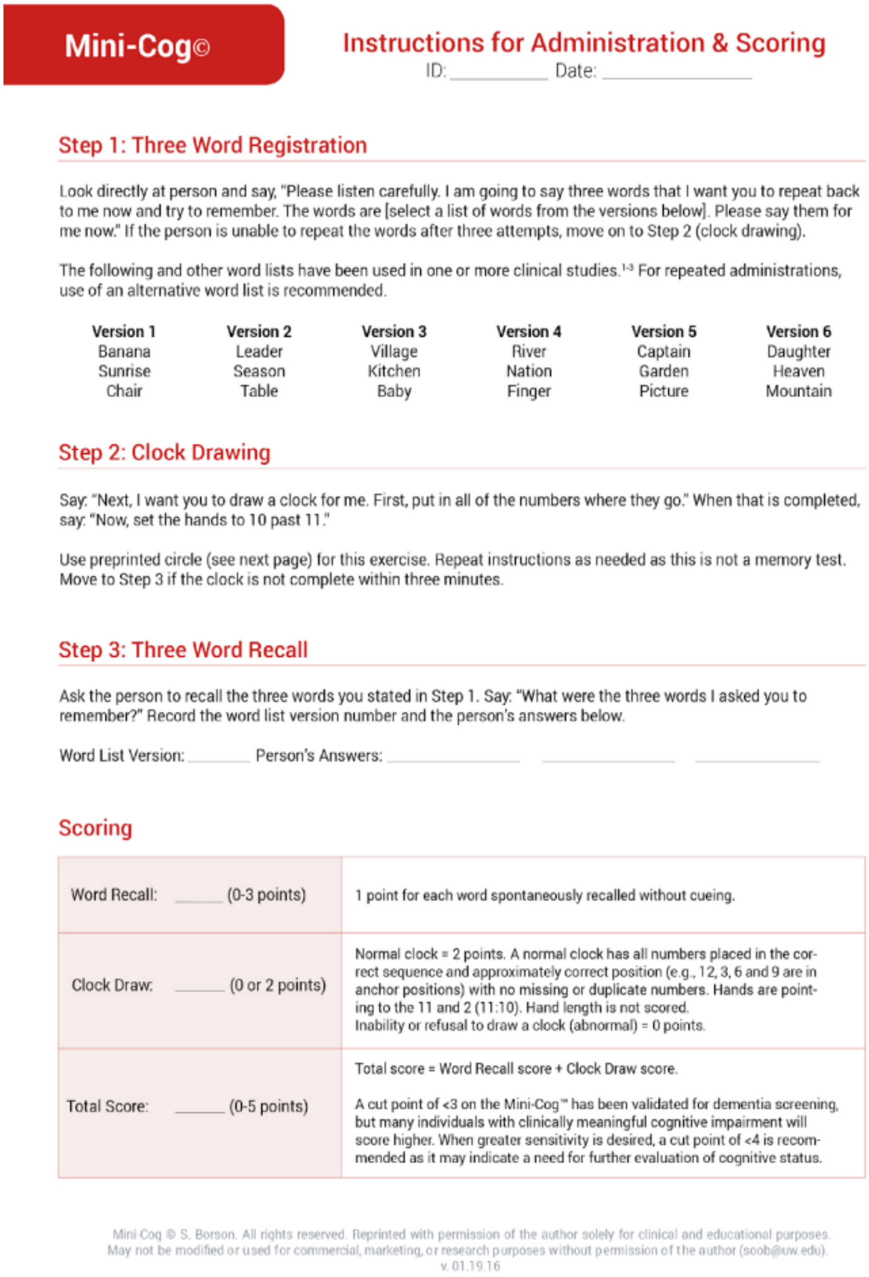
Suggested etiology	Key findings on history and examination
Alzheimer disease	Insidious and gradual onset of memory and learning symptoms without evidence of plateaus; recall of recent events is most affected; cardiovascular disease risk factors; depression and apathy; sleep disturbances
Delirium	Recent hospitalization or acute illness, inattention, fluctuating behavior changes, altered level of consciousness
Frontotemporal dementia	Socially inappropriate behaviors; loss of empathy; changes in dress, eating habits, religious/political beliefs; development of compulsive behaviors; progressive aphasia
Human immunodeficiency virus infection	History of high-risk sexual behavior or drug use, apathy, poor attention and concentration, hyperreflexia, slow limb movements
Hypoperfusion from heart failure	Syncope, history of heart failure
Intracranial tumor	Seizures, neurologic deficits
Medication adverse effects	Use of anticholinergic drugs, benzodiazepines, opioids, or muscle relaxants
Neurocognitive disorder with Lewy body dementia	Daytime drowsiness, daytime naps lasting more than two hours, prolonged staring spells, disorganized speech, visual hallucinations, parkinsonian symptoms
Vascular dementia	History of symptoms beginning after cerebrovascular events
Other medical conditions	
Depression	Anhedonia, feelings of worthlessness, slowed speech, flat affect, sleep disturbance
Hypothyroidism	Fatigue, cold intolerance, constipation, weight gain, dry skin, prolonged deep tendon reflexes, myalgias
Neurosyphilis	History of high-risk sexual behavior or injection drug use, vision and hearing loss, decreased proprioception, stabbing extremity pains
Niacin/vitamin B_3 deficiency	History of bariatric surgery or malabsorption disorders, photosensitive rash, anxiety, insomnia, diarrhea, vomiting
Normal-pressure hydrocephalus	Urinary incontinence and broad-based, shuffling gait
Vitamin B_{12} deficiency	Ascending paresthesias, tongue soreness, limb weakness, weight loss
Wernicke-Korsakoff syndrome	History of alcoholism, nystagmus or extraocular muscle weakness, broad-based gait and stance

Adapted with permission from Simmons BB, Hartmann B, Dejoseph D. Evaluation of suspected dementia. Am Fam Physician. *2011;84(8):897, with additional information from references 23 through 27, 31, and 32.*

Screening Tests for Cognitive Impairment

Mini-Cog tool:

- A brief, structured cognitive assessment using *the Mini-Cog tool*, provide primary care physicians' spontaneous detection of mild cognitive impairment or dementia.
- Three-item recall: may indicates impaired short-term memory.
- Clock drawing: it assesses executive function and visual-spatial skills.



Mini-Cog©

Instructions for Administration & Scoring

ID: ________ Date: ____________

Step 1: Three Word Registration

Look directly at person and say, "Please listen carefully. I am going to say three words that I want you to repeat back to me now and try to remember. The words are [select a list of words from the versions below]. Please say them for me now." If the person is unable to repeat the words after three attempts, move on to Step 2 (clock drawing).

The following and other word lists have been used in one or more clinical studies.[1-3] For repeated administrations, use of an alternative word list is recommended.

Version 1	Version 2	Version 3	Version 4	Version 5	Version 6
Banana	Leader	Village	River	Captain	Daughter
Sunrise	Season	Kitchen	Nation	Garden	Heaven
Chair	Table	Baby	Finger	Picture	Mountain

Step 2: Clock Drawing

Say: "Next, I want you to draw a clock for me. First, put in all of the numbers where they go." When that is completed, say: "Now, set the hands to 10 past 11."

Use preprinted circle (see next page) for this exercise. Repeat instructions as needed as this is not a memory test. Move to Step 3 if the clock is not complete within three minutes.

Step 3: Three Word Recall

Ask the person to recall the three words you stated in Step 1. Say: "What were the three words I asked you to remember?" Record the word list version number and the person's answers below.

Word List Version: ______ Person's Answers: ____________ ____________ ____________

Scoring

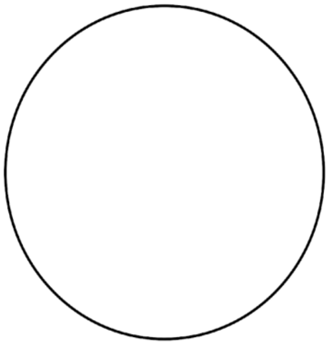
Word Recall: ______ (0-3 points)	1 point for each word spontaneously recalled without cueing.
Clock Draw: ______ (0 or 2 points)	Normal clock = 2 points. A normal clock has all numbers placed in the correct sequence and approximately correct position (e.g., 12, 3, 6 and 9 are in anchor positions) with no missing or duplicate numbers. Hands are pointing to the 11 and 2 (11:10). Hand length is not scored. Inability or refusal to draw a clock (abnormal) = 0 points.
Total Score: ______ (0-5 points)	Total score = Word Recall score + Clock Draw score. A cut point of <3 on the Mini-Cog™ has been validated for dementia screening, but many individuals with clinically meaningful cognitive impairment will score higher. When greater sensitivity is desired, a cut point of <4 is recommended as it may indicate a need for further evaluation of cognitive status.

Mini-Cog © S. Borson. All rights reserved. Reprinted with permission of the author solely for clinical and educational purposes. May not be modified or used for commercial, marketing, or research purposes without permission of the author (soob@uw.edu).

v. 01.19.16

Clock Drawing

ID:__________ Date:______________



Complete Evaluation for Patients Who Screen Positive screening

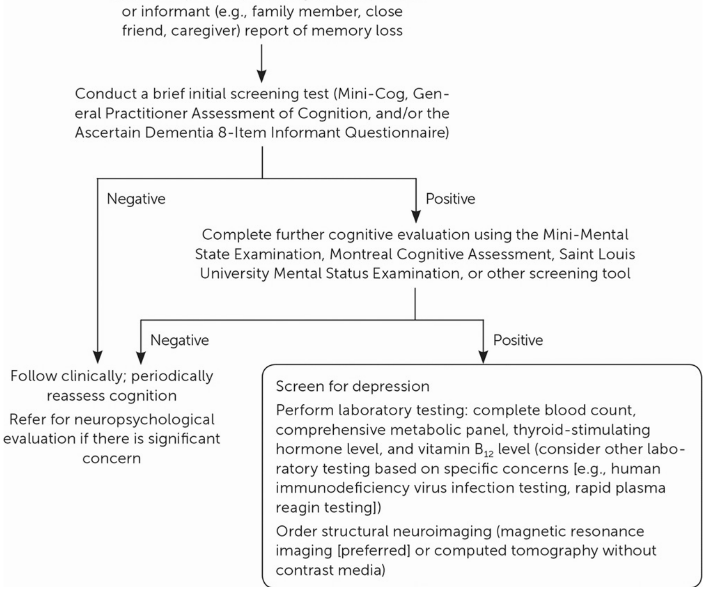
Patients with an abnormal screening evaluation (verbal fluency test, Mini-Cog, or Sweet 16) should have follow-up cognitive testing and further laboratory testing, with or without imaging studies, to rule out secondary causes of dementia.

Table 3. Studies Recommended by the American Geriatrics Society for Patients with Suspected Dementia

Laboratory tests	*Imaging tests*	*Tests to consider in patients with specific risk factors*
Calcium level Complete blood count Complete metabolic panel Folate level Thyroid-stimulating hormone level* Vitamin B_{12} level*	Computed tomography or magnetic resonance imaging of the brain if any of the following are present: • Abrupt or rapid decline • Age younger than 60 years • Focal deficits • Predisposing conditions Consider positron emission tomography if definitive diagnosis will change management decisions	Cerebrospinal fluid analysis Human immunodeficiency virus test Lyme titer Rapid plasma reagin test

**—The only tests routinely recommended by the American Academy of Neurology for all patients with suspected dementia are thyroid-stimulating hormone and vitamin B_{12} levels.*[28]

Information from references 27 and 28.


Clinical suspicion of memory loss, or patient or informant (e.g., family member, close friend, caregiver) report of memory loss
Conduct a brief initial screening test (Mini-Cog, General Practitioner Assessment of Cognition, and/or the Ascertain Dementia 8-Item Informant Questionnaire)
Negative
Positive
Complete further cognitive evaluation using the Mini-Mental State Examination, Montreal Cognitive Assessment, Saint Louis University Mental Status Examination, or other screening tool
Negative
Positive
Follow clinically; periodically reassess cognition
Refer for neuropsychological evaluation if there is significant concern
Screen for depression
Perform laboratory testing: complete blood count, comprehensive metabolic panel, thyroid-stimulating hormone level, and vitamin B12 level (consider other laboratory testing based on specific concerns [e.g., human immunodeficiency virus infection testing, rapid plasma reagin testing])
Order structural neuroimaging (magnetic resonance imaging [preferred] or computed tomography without contrast media)

Geriatric Assessments:

Functional Assessment:

- Functional status refers to a person's ability to perform tasks that are required for living.
- The geriatric assessment begins with a review of the two key divisions of functional ability:

1. **Activities of daily living (ADL):** Self-care activities that a person performs daily (e.g., eating, dressing, bathing, transferring between the bed and a chair, using the toilet, controlling bladder and bowel functions).
2. **Instrumental activities of daily living (IADL):** Are activities that are needed to live independently (e.g., doing housework, preparing meals, taking medications properly, managing finances, using a telephone).

- **Advanced activities of daily living (AADL):** tasks requiring a higher level of understanding and integration into societal and community roles, some examples include occupational, recreational, and travel activities.
- For highly functional patient, a simple open-ended question asking How a typical day is spent provides a good review of daily function or by Two instruments for assessing ADL and IADL include the Katz ADL scale and the Lawton IADL scale.

Mobility Assessment:

- Mobility includes a wide range of activities, from walking across a room to airline travel.
- Two recommended screening questions are:

1. Do you have difficulty climbing up 10 steps or walking 0.25 miles?
2. Because of health or physical reasons, have you modified the way you climb 10 steps or walk 0.25 miles (either by changing the method or frequency of these activities)?

Qualitative gait assessment:

- Direct qualitative and quantitative observation of gait to determine stability is a quick and important assessment component.
- Qualitative aspects include evaluation of include:

1. Step length (e.g., heels do not clear toes of other foot)
2. Step height (e.g., heels do not clear floor)
3. Hesitancy
4. Sway
5. Symmetry
6. Continuity
7. Path deviation

Balance:

- **Tests of balance include:**

1. Ability to maintain a side-by-side, semi-tandem, and full-tandem stance for 10 seconds.
2. Resistance to a nudge
3. Stability during a 360-degree turn.

Up and Go Test:

- Is a timed test of the patient's ability to rise from a standard armchair {without the use of armrests} , walk 3 meters (10 feet), turn, walk back, and sit down again.

Fall Risk Assessment:

- All older patients should be asked at least yearly if they have fallen, and frail older persons should be asked about falls at every visit. A single screening Question: "Have you fallen in the past year?"

Mood disorders - Depression assessment:

- Depression in older adults may present atypically and may be difficult to assess in patients with cognitive impairment.
- A two-question screener to identify patients at risk of depression, the questions are:

1. "During the past month, have you been bothered by feeling down, depressed, or hopeless?"
2. "During the past month, have you been bothered by little interest or pleasure in doing things?"

Urine Incontinence:

- The incidence of urinary incontinence increases with age, urinary incontinence is abnormal at any age and significantly affects quality of life.
- A two-question screening tool is effective in identifying urinary incontinence:

1. In the past year, have you ever lost your urine and gotten wet?
2. If so, have you lost your urine on at least six separate days?

- Positive responses to both questions should lead to a more in-depth assessment of transient and established factors that are contributing to the incontinence.

Weight Loss and Malnutrition:

- Medicare defines normal body mass index (BMI) in older adults as 23 to 30 kg per m2: BMI less than 23 kg per m2 is associated with increased mortality.
- Screening for nutritional impairment in older adults can be accomplished by asking a single question (e.g., "Have you lost weight in the past six months?"), monitoring weight, or asking patients or caregivers to complete the Mini Nutritional Assessment

Polypharmacy:

- Defined as regular use of at least five medications.
- Why older adults are especially impacted by polypharmacy?

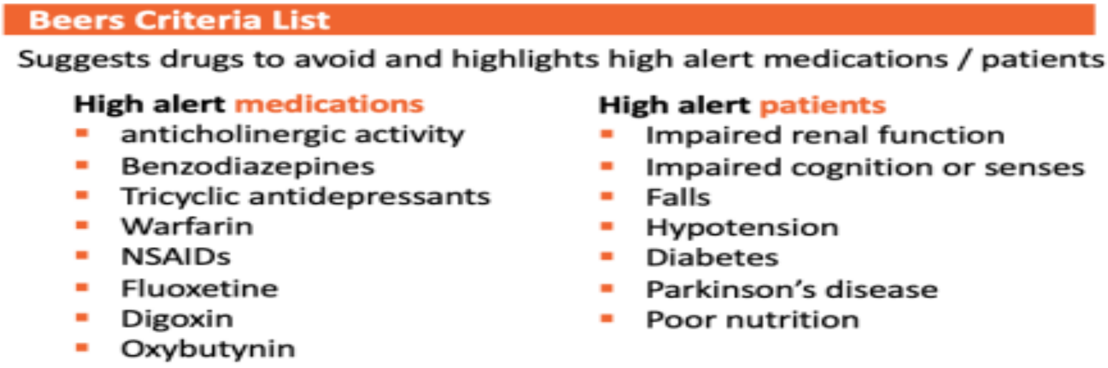
1. Due to metabolic changes and decreased drug clearance associated with aging.
2. Increases the potential for drug-drug interactions.
3. Problems with adherence in older adults, especially if compounded by visual or cognitive impairment.

- Various criteria have been developed by expert to assess the quality of prescribing practices and medication use in older adult individuals. The most widely used criteria for inappropriate medications are the beers criteria
- The Beers criteria: list potentially inappropriate medications for most older adults, medications to avoid with specific conditions, and aids decision making when using a drug.

1. Avoid the concurrent use of opioids with either benzodiazepines or gabapentinoids
2. Use caution when prescribing trimethoprim-sulfamethoxazole in patients who are taking an ACE or ARB), and who have decreased creatinine clearance, to avoid hyperkalemia.
3. H2-receptor antagonists may be used in patients with dementia, although they should be avoided in patients with delirium.

4. Use caution when recommending aspirin for primary prevention of cardiovascular disease or colorectal cancer in patients aged 70 or older due to increased risk of bleeding.
5. Avoid the use of SNRIs in patients with a history of falls or fractures.
6. Avoid the use of sliding-scale insulin regimens due to the risk of hypoglycemia without benefit of improvement in hyperglycemic management.

- STOPP (screening tool of older persons' prescriptions)
- START (screening tool to alert doctors to right treatment)



Beers Criteria List

Suggests drugs to avoid and highlights high alert medications / patients

High alert medications
- anticholinergic activity
- Benzodiazepines
- Tricyclic antidepressants
- Warfarin
- NSAIDs
- Fluoxetine
- Digoxin
- Oxybutynin

High alert patients
- Impaired renal function
- Impaired cognition or senses
- Falls
- Hypotension
- Diabetes
- Parkinson’s disease
- Poor nutrition

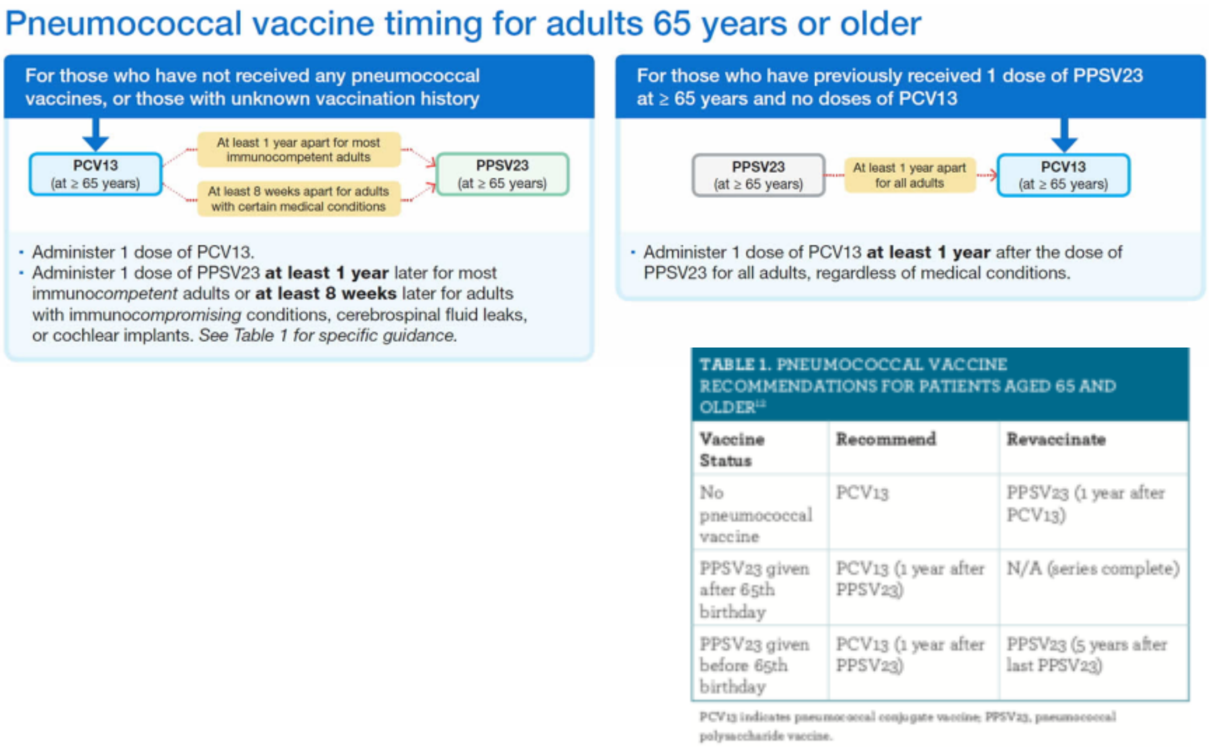
Screening

Disease	Gender	Age	Tool	Repeat	Note
DM	Both	=> 45	Fasting HbA1c	Normal: 3 y Abnormal: 1 y	Women with hx of GDM repeated every 3 yr Pregnant with hx of GDM do 2H OGGT in first visit
HTN	Both	=>18	Bp monitor	Every visit	
Dyslipididema	Male Female	=> 35 => 45	• Total Cholesterol • HDL	- Normal: 5yrs - Abnormal + high risk: 3yrs	For high risk individual 25-30 for male 30-35 for female
Obesity	Both	At any age	BMI		
Osteoporosis	Female	65-80	Dexa Scan	Normal 10-15 yrs	▪ Less than 65 yrs. in past menopause or high risk: hysterectomy ▪ => 65 yrs. in male with high risk ➢ Dexa interpretation T-Score: • -1.0 to -2.5 osteopenia • less -2.5 osteoporosis supplement need :1200 mg of calcium / 600 IU of vitamin D
AAA	Male	65-75	Abdominal duplex ultrasound	Depend on size And once for normal size	Indication: smoker, family history of AAA Size and follow up: • 3.0 to 3.9 cm every 3 yrs. • 4.0 to 4.9 cm every 12 month • 5.0 to 5.4 cm every 6 month • More than 5.5 cm for surgery
Breast cancer BC	Female	50-75	Mammogram	Every 2 yrs	Start at age 40 if she has 1st degree relative with cancer Do genetic test if : • 1st relative with BC less than 45 yrs. • More than breast cancer in one individual If there is abnormality tissue in mammogram Fu pt. depend on BIRAD score: Stage 1: yearly Stage 2-3: every 6 months Stage 4-5: do biopsy Stage 6: surgery remove
Lung cancer	Both	55-80	Low dose chest CT scan	Yearly	Screen for • Pt who more than 30 pack year smoking • Who is current smoker • Who stop smoking with in 15 years or less { if pt. quit smoking more than 15 yrs. no screening }
Colon cancer	Male	50 -75	• Colonoscopy • Sigmoidscopy • Sigmoid +FIT Sigmoid 5yrs + FOT 3 yrs Fit 1 yrs	Every 10 years Every 5 years Every 10 years	Low risk : • General population • One of 1st degree relative more than 60 years with colon cancer
40 yrs or 10 yrs before relative age			Colonoscopy every 3-5 years		High risk : 1st degree of relative less than 60 yrs with colon cancer /adenomatous polyps more than two 1st degree relative at any age with colon cancer
Cervical cancer	Female	21-65	Cytology every 3 years HPV every 5 years Both test every 5 years		• For 21- 29 only cytology for screening • More than 30 years: all type of screening you can use

Immunization in Geriatric:

What vaccine dose CDC strongly recommend for geriatrics?

- **Influenza vaccination:**
    - Routine annual is recommended for all persons aged >6 months who do not have contraindication, seasonal (early September)
- **Pneumococcal vaccination:**



Pneumococcal vaccine timing for adults 65 years or older

For those who have not received any pneumococcal vaccines, or those with unknown vaccination history

PCV13
(at ≥ 65 years)
At least 1 year apart for most immunocompetent adults
At least 8 weeks apart for adults with certain medical conditions
PPSV23
(at ≥ 65 years)

- Administer 1 dose of PCV13.
- Administer 1 dose of PPSV23 **at least 1 year** later for most immuno*competent* adults or **at least 8 weeks** later for adults with immuno*compromising* conditions, cerebrospinal fluid leaks, or cochlear implants. *See Table 1 for specific guidance.*

For those who have previously received 1 dose of PPSV23 at ≥ 65 years and no doses of PCV13

- Administer 1 dose of PCV13 **at least 1 year** after the dose of PPSV23 for all adults, regardless of medical conditions.

TABLE 1. PNEUMOCOCCAL VACCINE RECOMMENDATIONS FOR PATIENTS AGED 65 AND OLDER[12]

Vaccine Status	Recommend	Revaccinate
No pneumococcal vaccine	PCV13	PPSV23 (1 year after PCV13)
PPSV23 given after 65th birthday	PCV13 (1 year after PPSV23)	N/A (series complete)
PPSV23 given before 65th birthday	PCV13 (1 year after PPSV23)	PPSV23 (5 years after last PPSV23)

PCV13 indicates pneumococcal conjugate vaccine; PPSV23, pneumococcal polysaccharide vaccine.

- **Tetanus, diphtheria, and pertussis (Tdap) vaccine:**
    - Adults who have never received Tdap are recommended to receive1 dose Tdap than Td as a booster shot every 10 years.
- **Zoster vaccine:**

1. Zoster vaccine live (Zostavax) **ZVL**.
2. Recombinant zoster vaccine (Shingrix) **RZV**

- **Age 50 years or older:** 2 dose of recombinant zoster vaccine 2-6 months apart (minimum interval 4 weeks), regardless of previous herpes zoster or history of ZVL vaccination (administer RZV at least 2 months after ZVL)
- **Age 60 years or older:** 2 dose of recombinant zoster vaccine 2-6 months apart (minimum interval 4 weeks) **or** 1 dose of Zoster vaccine live if not previously vaccinated.
- **RZV Preferred over ZVL:** Sever immunocompromising condition (including HIV with CD4 less than 200 cell: ZVL is counterindication, recommended use of RZV under review

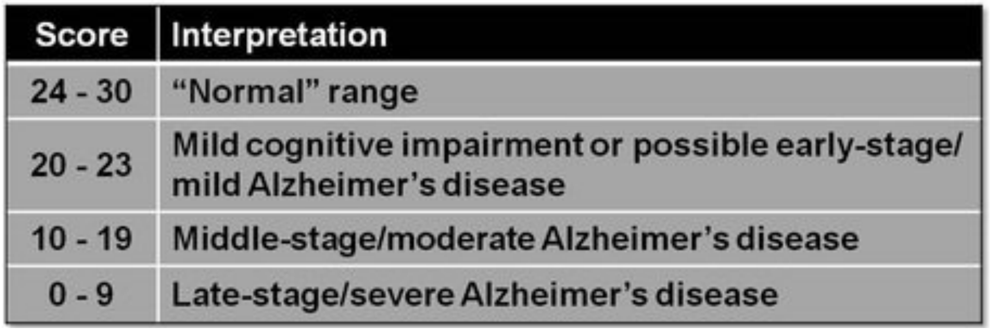
Geriatric MCQ

Mid-Year KFMC 2022

Mini Mental Status Exam score 24/30

A. Normal
B. Mild cognitive impairment
C. Mild dementia
D. Moderate cognitive impairment

Answer: A



Score	Interpretation
24 - 30	“Normal” range
20 - 23	Mild cognitive impairment or possible early-stage/ mild Alzheimer’s disease
10 - 19	Middle-stage/moderate Alzheimer’s disease
0 - 9	Late-stage/severe Alzheimer’s disease

A 65 years old diabetic patient, received PPSV23 vaccine 6 months ago, he completed all of his other vaccinations except for influenza vaccine, what to do for him?

A. give influenza vaccine only
B. give PCV13 then give PPSV23 after 1 year, with 5 years period between the
C. first and second PPSV23 vaccine
D. No need for vaccines currently
E. Give pcv13 vaccine only

Answer: A

For adults ≥65 years, we give PPSV23. We generally do not give PCV13 unless they have another indication for PCV13 (eg, immunocompromised, asplenia, cerebrospinal fluid leak, cochlear implant, other head, neck, or spinal defects that may result in communication with the subarachnoid space, or history of invasive pneumococcal disease) because the incidence of pneumococcal disease caused by PCV13 serotypes is very low. (UpToDate)

ABFM 2022

An 83-year-old female with a history of Alzheimer's dementia presents with concerns about worsening agitation in the evenings. She is accompanied by her daughter who has power of attorney. The patient is dependent on her daughter for all instrumental activities of daily living and requires assistance with certain core activities of daily living such as dressing and bathing. She has no other chronic medical problems. Her daughter states that starting around 4:00 p.m., the patient becomes increasingly disoriented and agitated. There has been no physical aggression, but the daughter asks for medical intervention to "help calm her down." Which one of the following should you recommend initiating first for the management of this patient's symptoms?

A. Sensory stimulation including touch and music
B. Cognitive training
C. Haloperidol
D. Quetiapine (Seroquel)
E. Valproic acid

ANSWER A

This patient is experiencing behavioral and psychological symptoms of dementia (BPSD) as her cognitive and functional status decline. Evening agitation is a common form of BPSD, often referred to as sundowning. As with most BPSD, a nonpharmacologic approach to improve agitation has much stronger evidence for efficacy compared to a pharmacologic approach. A recent network meta-analysis showed that sensory stimulation, including massage, touch, and music therapy, significantly outperforms pharmacologic intervention (level of evidence 1a). Cognitive training, especially for BPSD in the context of advanced dementia, does not have strong evidence to support its use. Pharmacologic intervention should be initiated with caution given the potential for side effects, and should be a last resort in situations where there is a risk of self-harm or harm to others.

You receive a call from a hospitalist reporting that a 77-year-old male who is a patient of yours has been admitted to the hospital. You note that this is his third hospital admission over the last 4 months, due to a variety of acute medical concerns. His medical history includes heart failure, mild dementia, chronic kidney disease, and type 2 diabetes. You consider transitions of care planning for this patient upon discharge. Which one of the following interventions would offer the best efficacy for this patient?

A. Rapid medication reconciliation, a home visit, and follow-up with you within 7 days of discharge
B. Rapid medication reconciliation, a home visit, and follow-up with his endocrinologist within 7 days of discharge
C. Rapid post-discharge laboratory studies, and follow-up with his cardiologist within 7 days of discharge
D. Rapid post-discharge laboratory studies, and follow-up with both you and his cardiologist within 7 days of discharge
E. Rapid medication reconciliation, rapid post-discharge laboratory studies, and follow-up with his endocrinologist within 7 days of discharge

ANSWER: A

Given this patient's substantial burden of multimorbidity as well as ongoing patterns of high acute care utilization, he is at very high risk for readmission upon discharge. Although there has been significant heterogeneity across interventions over the last decade in optimizing transitions of care for high-risk patients, many analyses, including systematic reviews, have identified medication reconciliation and close follow-up with a primary care physician to be among the components critical to success, along with a home visit from either a nursing team member or a licensed independent practitioner. There is no clear evidence that rapid post-discharge laboratory studies improve outcomes. While there may be a tendency to focus on disease-specific interventions via specialty care, the preponderance of evidence supports a holistic focus through comprehensive primary care follow-up. Primary care continuity and accountability for care after discharge are also key components valued by patients and caregivers.

An 80-year-old female is brought to the emergency department after her family finds her on the floor at her home. They state that she has been confused and not acting like herself for the past 5–7 days. She lives independently and cares for herself, and she is active in a senior church group. The patient is unable to explain why she was on the floor, so the history is obtained from the family. There are no other associated symptoms and no known inciting incident. There have been no recent medication changes and the family is unaware of any fever or chills. The patient has not had episodes like this in the past. Her past medical history is notable for controlled blood pressure and a TIA several years ago with no residual neurologic deficit or impairment. A physical examination is negative except for her confusion, and there are no focal neurologic findings. Imaging shows no acute process. Which one of the following is the most likely explanation for these findings?

A. Alzheimer’s disease
B. Delirium
C. Ischemic stroke
D. Mild neurocognitive disorder
E. Vascular dementia

ANSWER: B

This patient presents with acute altered mental status. Delirium should always be considered in this setting because it is both common and frequently overlooked (SOR C). There are multiple potential causes of this patient’s acute altered mental status, including but not limited to systemic infections, metabolic disturbances, medications, systemic conditions, and central nervous system insults such as ischemic stroke. The clinical examination does not indicate the focal neurologic changes of a stroke, and this patient’s TIA was several years ago with no subsequent chronic cognitive changes. The history and examination in this case do not suggest the presence of chronic cognitive changes indicative of conditions such as Alzheimer’s disease, mild neurocognitive disorder, or vascular dementia. Alzheimer’s disease has an insidious and gradual onset of cognitive symptoms. In vascular dementia, the symptoms begin after cerebrovascular events. Importantly, in the setting of acute mental status changes, the Choosing Wisely campaign recommends not presuming a diagnosis of dementia in an older adult with acute symptoms of confusion without first assessing for delirium.

Which one of the following interventions has the best evidence for effectiveness in the treatment of frailty syndrome in geriatric patients?

A. Protein supplements
B. Vitamin D supplements
C. Hormonal treatment with anabolic steroids

D. Aerobic conditioning training
E. Progressive resistance training

ANSWER: E

In geriatric patients with frailty syndrome, the intervention with the best evidence for effectiveness is progressive resistance training as a part of a physical activity program. The routine use of protein supplements, vitamin D supplements, or hormonal treatments, including anabolic steroids, is not recommended. Aerobic conditioning training may be helpful but the strongest evidence for efficacy is for activities that include progressive resistance training.

Promotion 2022

A 60s with ischemic heart disease and hypertension brought by her son complaining that she has symptoms of cognitive impairment. However she also has sympyoms of imbalance and she sustained falls. Romberg test +ve and +ve pronator drift

A. Alzahaimer’s
B. Vascular dementia

*Answer: B

(Typical scenario of delirium) Elderly day 1 post joint replacement surgery in the hospital with visual hallucinations seeing things.

Answer: Delirium

Part 1-2 2022

68-year-old female, brought by her daughter with symptoms of low mood, hx of memory loss and low concentration (oriented to person but not to time or place), not smiling and looks apathetic, no previous hx of depression mental status examination 14/30
What is the most likely diagnosis?

A. MDD
B. Alzheimer‘s disease
C. Parkinson disease

Answer: **B**

Alzheimer's disease: cognitive impairment (MMSE 14/30) + memory loss

Son brought his father to the clinic, because he had multiple falls attacks lately (fell 3 times last week). The father said it was nothing, he just suddenly lost his balance. He is on Diuretics for HTN. When you examined him, you found multiple bruises. What is the most important next step?

A. ECG and metabolic profile
B. Refer for physiotherapy for balance exercise
C. Visual field test

Answer A

The most common cause of dementia is?

A. Cardiovascular accidents
B. Alzheimer disease
C. Lewy bodies
D. Infections

ANSWER: B

Female brought her father and tells you she is concerned about him, he started skipping his weekly social gatherings, he is not bathing. Your next step?

A. PHQ9
B. Brain imaging

ANSWER: A

Old patient, hypertensive, smoker, came with past history of stroke. Came for follow-up after his stroke. What could be done as tertiary prevention?

A. Smoking cessation program
B. Treat hypertension
C. Colon cancer screening
D. Stroke rehabilitation program

ANSWER: D

Tertiary prevention focuses on people who are already affected by a disease. The goal is to improve quality of life by reducing disabilities, limiting or delaying complications and restoring function. Answer A is primary prevention, answer B and C are secondary prevention, B prevent complications and C prevent disease occurrence. D is tertiary prevention, prevent further comorbidities and improve quality of life

You are seeing a husband and wife for their routine physicals. They have received a flyer in the mail suggesting they have ultrasonography to screen for abdominal aortic aneurysm (AAA). According to the United States Preventive Services Task Force (USPSTF), which of the following individuals should receive this screening?

A. A 76-year-old man with hypertension and a 25-pack-year smoking history
B. A 65-year-old woman with a 30-pack-year smoking history
C. A 67-year-old man with a 10-pack-year smoking history
D. A 70-year-old man with hypertension who has never smoked
E. A 57-year-old woman with a 20-pack-year smoking history

ANSWER: C

Risk factors for AAA include male gender, age, hypertension, and tobacco use. The USPSTF recommends a one-time ultrasonography screening for males aged 65 to 75 years of age who have ever smoked. This current recommendation is not based on pack-year history. The USPSTF recommends against the universal screening sof women who have never smoked and finds insufficient evidence to recommend screening in women aged 65 to 75 years who have ever smoked.

You are seeing a patient with a smoking history for a routine health examination. Which of the following attributes would exclude this patient from the current USPSTF lung cancer screening recommendations with low-dose computed tomography (LDCT) of the chest?

A. A 79-year-old man who quit smoking 10 years ago
B. A 65-year-old woman who quit smoking 20 years ago
C. A 56-year-old man with a 30-pack-year smoking history
D. A 75-year-old woman who continues to smoke
E. A 71-year-old woman who has signed a Do Not Resuscitate (DNR) order

ANSWER: B

The USPSTF has concluded that screening for lung cancer with LDCT is of moderate net benefit in asymptomatic individuals at high risk for lung cancer. They recommend screening in individuals "aged 55 to 80 who have a more than or equal to 30- pack-year smoking history and currently smoke or have quit within the past 15 years." The task force recommends discontinuing screening once a patient has not smoked for 15 years, and recommend not screening if the patient has a condition resulting in a limited life- expectancy or would not be able or willing to undergo curative lung surgery. This recommendation is somewhat controversial, due to the concerns for radiation exposure over the 25-year span based on a study that occurred over a 3-year period of time.

You are discussing options for colorectal cancer screening for a 51-year-old patient. Although several options exist, which of the following choices and screening intervals is most appropriate for asymptomatic individuals aged 50 to 75 at average risk?

A. Guaiac-based fecal occult blood test (gFOBT) every 2 years
B. Flexible sigmoidoscopy every 3 years
C. Fecal immunochemical tests (FIT) every year
D. Colonoscopy every 5 years
E. Computed tomography (CT) colonography every year

ANSWER: C

Both the AAFP and the USPSTF recommend screening for colorectal cancer in individuals of average risk between the ages of 50 and 75. The most useful screening for low risk individuals is usually colonoscopy every 10 years; however, this option may not be available for all patients. Decisions to screen between the ages of 76 and 85 years should be individualized and should consider benefits and risks in this population. Screening can be accomplished through indirect tests such as gFOBT, FIT, CT colonography, or with direct visualization tests such as flexible sigmoidoscopy. Optimal screening intervals based on surveillance models and life-years gained indicate the gFOBT and FIT should be performed yearly, while CT colonography and flexible sigmoidoscopy should be performed every 5 years. For a similar benefit, colonoscopy has a longer screening interval at once every 10 years. FIT and colonoscopy have similar efficacy on reduction of mortality, but colonoscopy is associated with greater risks. When polyps or colorectal cancer are diagnosed in a patient by one of these measures, surveillance is no longer considered screening and these intervals no longer apply.

You are discussing cancer screening with a female patient. She has no family history of breast cancer, and routine risk analysis indicates that she is not at increased risk for the disease. According to the USPSTF, at what age should she start getting routine mammograms?

A. 30 years
B. 35 years
C. 40 years
D. 45 years
E. 50 years

ANSWER: E

Mammographic screening has been shown to decrease mortality from breast cancer. However, screening interval and recommendations have changed based on evidence review. As recently as 2009, the USPSTF developed evidence-based recommendations to help guide physicians and patients. Those guidelines include recommendations that decisions to conduct screening before the age of 50 should be individualized and take into account patient’s risks and preferences. There is a stronger recommendation that women between the age of 50 and 74 years should get screening mammograms every 2 years. Therefore, in this question, the correct answer is to begin routine screening at age 50.

In a routine examination, a 33-year-old woman asks you about breast self-examination (BSE) as a breast cancer screening method. Which of the following best represents the current American Academy of Family Physicians (AAFP) recommendations regarding BSE in average-risk females?

A. There is strong evidence that BSE is an appropriate screening modality.
B. There is limited evidence that BSE is an appropriate screening modality.
C. Available evidence shows that BSE reduces the need for additional testing or biopsy.
D. There is insufficient evidence to recommend for or against BSE.
E. Clinicians should not teach their female patients how to perform effective BSE.

ANSWER: E

The issues surrounding BSE remain controversial. While it is true that most breast cancers are found by women (not by mammography or by clinical breast examination), the AAFP and the USPSTF have reviewed the evidence and found that a significant number of additional imaging procedures and biopsies were performed for women performing BSE than control participants. The increased number of negative procedures and costs associated with this led the USPSTF and the AAFP to recommend against the performance of BSE for women at average risk for breast cancer. Prior to 2009, there was insufficient evidence to recommend for or against teaching or performing BSE.

You are seeing a 60-year-old patient for her annual physical examination. She has been married to her husband for 32 years and reports that both have been monogamous. Records indicate that she has had normal Pap smears every 1 to 2 years for the last 20 years, and has one abnormal pap with colposcopy indicating CIN I but regressed spontaneously without treatment 10 years prior. At what age is it appropriate to discontinue Pap screening on this patient?

A. 55 years
B. 60 years
C. 65 years
D. 70 years
E. Never discontinue screening.

ANSWER: C

Current guidelines indicate that screening for cervical cancer should be conducted with cytology (pap smear) every 3 years in women aged 21 to 65. In women aged 30 to 65 who wish to lengthen the interval, screening with cytology and HPV testing should occur every 5 years. Women should be informed, however, that screening with HPV testing may increase positive screens and subsequent interventions. Screening should end at age 65 in women with adequate screening, which is described by the American Cancer Society/American Society for Colposcopy and Cervical Pathology/American Society for Clinical Pathology (ACS/ASCCP/ASCP) guidelines as three consecutive negative cytology results or two consecutive negative HPV results within 10 years prior. In a woman with a history of a high-grade lesion (CIN II or greater), whether they have had spontaneous regression or appropriate treatment, screening should continue for 20 years even if this means screening past the age of 65. For this question, the best answer is age 65.

You are caring for a healthy woman whose cousin was just diagnosed with unilateral breast cancer at age 33. Your patient has no other relatives with known histories of breast or ovarian cancer. Which of the following is true regarding the current recommendations for genetic screening for breast cancer mutations?

A. The patient should not be offered genetic testing.
B. The patient should be tested only if she is of Ashkenazi Jewish descent.
C. The patient should be screened with a breast cancer–specific risk prediction tool to determine if she should be referred for genetic testing.
D. The patient should be tested if her cousin with breast cancer is male. e. The patient should be offered testing regardless of her ethnicity.

ANSWER: C

The AAFP and the USPSTF recommend against routine referral for genetic counseling or routine genetic testing for breast cancer mutations when women do not meet specific high-risk criteria. For a woman with at least one family member with breast, ovarian, or other BRCA-related cancer, clinicians should use one of several breast cancer risk prediction screening tools to determine if the individual should have in-depth genetic testing. Family history characteristics associated with an increased likelihood of BRCA mutations include:

- Breast cancer diagnosis before age 50
- Bilateral breast cancer
- Both breast and ovarian cancer in the family
- Presence of male breast cancer
- Multiple cases of breast cancer
- One or more family members with two primary types of BRCA-related cancer • Ashkenazi Jewish ethnicity

You are seeing a 78-year-old man who was brought to the office by his daughter. The daughter says her father is becoming increasingly forgetful. His medical history is significant for a 20-year history of type 2 diabetes and well-controlled hypertension. On examination, he is mildly hypertensive with otherwise normal vital signs. He is oriented to time, place, and person, but is unable to complete "serial sevens" on a minimental status examination. Which of the historical features make this diagnosis more consistent with dementia as opposed to delirium?

A. His history of hypertension
B. His history of diabetes
C. His current level of orientation
D. His inability to complete serial sevens.
E. The recent onset of his symptoms

ANSWER: C

Dementia is an acquired, persistent, and progressive impairment in intellectual function with compromise of memory and at least one other cognitive domain. This may be aphasia, apraxia, agnosia, or impaired executive function. In dementia, the level of consciousness is not clouded, but disorientation may occur later in the illness.

Hypertension and diabetes may be seen with both delirium and dementia. The inability to complete serial sevens (count backward from 100 by 7s) may be related to dementia but may also have to do with the patient's baseline educational level. Although his symptoms have appeared recently, it is often difficult to pinpoint the exact onset of dementia. Delirium is seen as being more abrupt in onset.

Use the following scenario: You are seeing a 74-year-old woman accompanied by her son. He is concerned that his mother has developed problems with her memory since the death of her husband 1 year ago. He reports that she is forgetful, often repeating questions multiple times. She calls him frequently in the middle of the night reporting that there are strangers in her house. If he sleeps at her house, he notes that her sleep is restful but she wakes frequently. Recently, she has begun to get lost while driving and he had to take her keys away. She states that her memory is "impeccable" and feels that her son is being overly critical. Her past medical history is only positive for hypothyroidism and OA. On physical examination, you note that she is not her typically well-kept self; her hair is not combed, and she has dirty clothes. She has no focal neurologic deficits. Cranial nerves and muscle strength are normal. Her timed get-up and go testing are normal and she does not have any gait abnormalities. She is alert to person, place, and time. However, her mini-cog is abnormal; she is unable to recall two of the three items you listed, and her clock drawing is markedly abnormal. Which of the following is most likely in this patient?

A. Lewy Body dementia
B. Parkinson disease
C. Behavioral variant frontotemporal dementia
D. Alzheimer disease
E. Vascular dementia

ANSWER: D

Dementias often have overlapping features, sometimes making it difficult to delineate early during the disease. Lewy body dementia is characterized by visual hallucinations, fluctuating attention, and gait/motor/sleep disturbances. Similarly, Parkinson disease is associated with fluctuating attention, gait/motor/sleep disturbances, cogwheel rigidity, and a pill-rolling tremor. Cognitive impairment occurs early in Lewy Body disease while it has a much later onset in Parkinson. Frontotemporal dementia typically presents with behavioral, personality, and language changes. Vascular dementia has a stepwise progression in a patient with a history of stroke or significant vascular risk factors, such as hypertension or diabetes. This patient has no vascular history, has had a steady decline that is focused on memory and cognition. Nocturnal confusion is present, but without evidence of disordered sleep.

Which of the following would be most helpful in confirming this diagnosis?

A. History and physical examination
B. MRI of the brain
C. Lumbar puncture
D. Electroencephalogram (EEG)
E. Computed Tomography (CT) of the brain

ANSWER: A

Currently, there are no laboratory or imaging studies of sufficient accuracy to confirm the diagnosis of Alzheimer dementia (AD). Diagnosis of AD includes five steps: history, cognitive assessment, physical examination, laboratory testing (to rule out other causes of cognitive impairment), and establishing a working diagnosis. Neither EEG nor lumbar puncture would add to the diagnosis of AD, but may be useful if the presentation suggests other disorders such as delirium or infection.

At the end of this visit, the patient's son inquires as to his risk for developing this disorder. Of the following, which is the strongest risk factor for the development of this dementia?

A. Family history
B. Female gender
C. Advancing age.
D. Low levels of education
E. Cardiovascular risk factors

ANSWER: C

Epidemiologic studies have identified several genetic and environmental risk factors for Alzheimer disease. Increasing age is the strongest risk factor. The prevalence doubles every 5 years after the age of 65, with up to 50% of individuals aged 85 to 90 years old meeting criteria for the disease. Family history is another major risk factor, and individuals with a first-degree relative with the disease are 4 times more likely to develop the disease themselves. Other risk factors include female gender, low levels of education, cardiovascular risk factors, and a history of head trauma.

You are concerned that one of your 65-year-old patients is developing dementia. Which of the following, if present, would lead you to suspect dementia rather than delirium or depression?

A. Acute onset of symptoms
B. Difficulty with concentration
C. Signs of psychomotor slowing
D. Good effort with testing, but wrong answers e. Patient complaint of memory loss

ANSWER: D

Dementia is often difficult to distinguish from delirium or depression in the elderly. However, delirium is generally acute in onset and associated with a loss of concentration. Dementia's onset is insidious, and concentration is less likely to be a problem. Depression is associated with psychomotor slowing, while dementia is generally not. While people with dementia may complain of memory loss, it is far more likely that the patient's family will complain of the patient having memory loss in dementia. Depressed patients usually present themselves complaining of memory loss. Depressed and delirious patients will generally show poor effort in testing, while demented patients will generally display good effort, but get wrong answers.

You are caring for a 69-year-old woman with symptoms suggesting Alzheimer disease. Which of the following clinical features of Alzheimer disease is most likely to remain intact until the late stages of the disease?

A. The ability to recall new information.
B. Word-finding ability
C. The ability to draw complex figures (intersecting boxes or a clock)
D. The ability to calculate (balance a checkbook)
E. Appropriate social behavior

ANSWER: E

Often, memory disturbances are the presenting symptom in Alzheimer disease. Remote memories are well preserved initially, with the ability to recall new information being lost early in the illness. Difficulty with wordfinding is also noted early. Decreased ability to recognize and draw complex figures is an early sign of problems, as is the loss of the ability to calculate. Social propriety and interpersonal skills often remain strikingly preserved until late in the illness.

You decide to treat a 72-year-old man for Alzheimer dementia (AD). You choose to use donepezil (Aricept), and begin therapy. With respect to disease progression, which of the following statements best describes donepezil's effect on AD?

A. It dramatically slows the progression of neurodegeneration.
B. It modestly slows the progression of neurodegeneration.
C. It has no effect on the progression of neurodegeneration.
D. It modestly increases the progression of neurodegeneration.
E. It dramatically increases the progression of neurodegeneration.

ANSWER: C

Three cholinesterase inhibitors are approved for the treatment of Alzheimer disease. They include donepezil (Aricept), galantamine (Reminyl), and rivastigmine (Exelon). They reduce the metabolism of acetylcholinesterase, thereby prolonging its action at cholinergic synapses. They are associated with modest improvements in cognition, behavior, activities of daily living, and global measurements of functioning. However, they do not change the progression of neurodegeneration.

You are seeing an 82-year-old patient with moderately advanced AD. His wife is his primary caregiver and reports that he has had increasing behavioral symptoms over the last 6 months; he paces constantly, is often agitated, and lately, has been resisting the home health worker's care. Despite optimizing nonpharmacologic measures, he has become difficult for her to manage, and she would like for you to prescribe something to help with his aggressive behavioral symptoms. He currently takes only blood pressure medication and a statin. Which of the following would be the best initial choice for this patient?

A. Donepezil
B. Sertraline
C. Carbamazepine
D. Memantine
E. Risperidone

ANSWER: A

Behavioral symptoms are common in Alzheimer disease as it progresses. Managing behavioral symptoms can often be accomplished with good communication skills and support. However, when medication is needed, the first step should be a cholinesterase inhibitor such as donepezil; studies have demonstrated benefit in controlling aberrant behaviors. SSRIs can have a mild to moderate effect on mood, but are unlikely to affect aggressive behavior. Anticonvulsants and antipsychotic medications such as carbamazepine and risperidone are helpful in reducing agitation and aggressiveness in AD, but come with significant side effects and should be used after trialing a cholinesterase inhibitor.

Which of the following is the main feature of dementia of Alzheimer type?

A. Working memory loss
B. Impairment emotional memory
C. Impairment of learning of new information
D. Impairment episodic memory

ANSWER: C

Which one of the following cardiovascular changes is a recognized age-related effect?

A. Decreased maximal heart rate with exercise
B. Decreased myocardial collagen
C. Decreased myocardial mass
D. D)Increased left ventricular compliance.
E. Increased heart rate at rest

ANSWER: A

You see a 90-year-old patient with elevated blood pressure. Which one of the following is an expected physiologic change in elderly patients?

A. Increased renal blood flow
B. Increased diastolic blood pressure

C. Decreased systolic blood pressure
D. Decreased peripheral resistance
E. Wider pulse pressure

ANSWER: E

A 90-year-old female is being considered for transcatheter aortic valve replacement due to. severely symptomatic critical aortic stenosis. In addition to a medication review, which one of the following tests would be best to assess for frailty as a component of the preoperative assessment?

A. Gait speed
B. The Geriatric Depression Scale
C. The Confusion Assessment Method (CAM)
D. The Mini-Cognitive Assessment Instrument (Mini-Cog)

ANSWER: A

Many of the changes that occur as part of aging affect pharmacokinetics. Which one of the following is INCREASED in geriatric patients?

A. Drug absorption
B. The glomerular filtration rates
C. Lean body mass
D. The volume of distribution of water-soluble compounds such as digoxin
E. The percentage of body fat

ANSWER: E

An 82-year-old white male has a cardiopulmonary arrest while mowing his lawn and his heart rhythm is restored after 8 minutes of CPR by a neighbor. He is now your patient in the coronary care unit. He is on a ventilator and has severe hypoxic encephalopathy. Echocardiography shows an ejection fraction of 12% as a result of the massive anterior myocardial infarction he sustained. Your neurology consultant confirms that the patient will never again be able to meaningfully communicate and will be ventilator-dependent. Prior to this, the patient had been living independently and had no health problems. He has no living relatives, and his attorney confirms that he has no written advance directives. The neighbor, who is a close friend, tells you that on several occasions recently he and the patient had discussed such a scenario, and that the patient had said that if he had little chance of a meaningful recovery, he would not want to remain on life support. In consultation with the hospital ethics committee, which one of the following would be most appropriate in this case?

A. Transfer care of the patient to another physician
B. Ask a court to appoint a guardian to make medical decisions
C. Withdraw life support
D. Defer the decision regarding life support to the hospital attorney
E. Ask the patient’s attorney to decide whether to terminate life support

ANSWER: C

A 78-year-old female with advanced dementia is brought to your office by her family for a wellness examination. Other than appearing chronically ill and showing significant cognitive impairment, she has an unremarkable examination. Which one of the following should be offered to this patient?

A. A clinical breast examination
B. A Papanicolaou test
C. Mammography
D. Colonoscopy
E. No cancer screening

ANSWER: E
The Society of General Internal Medicine does not recommend cancer screening in adults with a life expectancy of less than 10 years

Sympathomimetic decongestants such as pseudoephedrine and phenylephrine can be problematic in elderly patients because they can

A. decrease blood pressure
B. cause bradycardia
C. worsen existing urinary obstruction
D. enhance the anticholinergic effects of other medications
E. enhance the sedative effects of other medications

ANSWER: C

A 75-year-old patient is admitted to the hospital. The Joint Commission National Patient Safety Goals program requires medication reconciliation for this patient both on admission and at the time of discharge. The primary intent of this reconciliation is to detect.

A. potentially inappropriate medication uses in the elderly
B. high-risk medication use

C. medication discrepancies
D. polypharmacy
E. adverse drug effects

Answer: C

In frail elderly patients, starvation can be distinguished from cachexia by which one of the following?

A. An inflammatory response seen in starvation
B. A normal appetite in the early stages of cachexia
C. A rapid decrease in albumin in the early stages of starvation
D. A reversal of changes with refeeding in starvation

ANSWER: D

A 76-year-old white male with heart failure is admitted to the hospital for the third time in a year. He responds to treatment with intravenous furosemide (Lasix), oxygen, and morphine. When he is discharged, his medications include carvedilol (Coreg), 25 mg twice daily; furosemide, 40 mg daily; and lisinopril (Prinivil, Zestril), 40 mg daily. He is also placed on a low-salt diet. Which one of the following is most likely to help prevent future admissions and decrease overall medical costs for this patient during the next year?

A. Case management by a heart failure specialist nurse
B. Nursing home admission
C. Adding amiodarone (Cordarone)
D. Increasing the dosage of lisinopril

ANSWER: A

An 82-year-old male presents to your office because his blood pressure has been “high” when taken by a friend on several occasions. His blood pressure in your office is 173/94 mm Hg, which is similar to the levels his friend recorded. The history and physical examination are otherwise unremarkable, and a CBC, metabolic panel, and urinalysis are normal. Which one of the following is most consistent with current evidence?

A. This patient’s mortality will not be affected by treatment of his hypertension
B. Treating this patient with an ARB for hypertension would be ineffective and dangerous
C. Treatment with a thiazide diuretic will lower this patient’s risk of death
D. In this age group, treatment of hypertension in males does not reduce stroke and heart failure as it does in females

ANSWER: C

A 78-year-old male presents for a routine follow-up visit for hypertension. He is a smoker but has no known coronary artery disease and is otherwise healthy. On examination you note an irregular pulse. An EKG reveals multiple premature ventricular contractions (PVCs), but no other abnormalities. Current guidelines recommend which one of the following?

A. Amiodarone (Cordarone) for suppression of PVCs
B. Flecainide (Tambocor) for suppression of PVCs
C. Evaluation for underlying coronary artery disease
D. No further evaluation or treatment

ANSWER: C

In patients with no known coronary artery disease (CAD), the presence of frequent premature ventricular contractions (PVCs) are linked to acute myocardial infarction and sudden death

A 91-year-old white male presents with a 6-month history of a painless ulcer on the dorsum of the proximal interphalangeal joint of the second toe. Examination reveals a hallux valgus and a rigid hammer toe of the second digit. His foot has mild to moderate atrophic skin changes, and the dorsal and posterior tibial pulses are absent. Appropriate treatment includes which one of the following?

A. Surgical correction of the hammer toe
B. Custom-made shoes to protect the hammer toe
C. Bunionectomy
D. A metatarsal pad

ANSWER: B

The treatment of foot problems in the elderly is difficult because of systemic and local infirmities, the most limiting being the poor vascular status of the foot. Conservative, supportive, and palliative therapy replace definitive reconstructive surgical therapy

You see a 90-year-old male with a 5-year history of progressive hearing loss. The most common type of hearing loss at this age affects.

A. predominantly high frequencies
B. predominantly mid frequencies
C. predominantly low frequencies
D. all frequencies roughly the same

ANSWER: A
In the geriatric population, presbycusis is the most common cause of hearing loss.

You are helping a hospice program manage the symptoms of a 77-year-old male with end-stage colon cancer. He has required increasingly higher doses of his opioid medication to control symptoms of pain and dyspnea. In this situation, it should be kept in mind that which one of the following adverse effects of opioids do NOT diminish over time?

A. Constipation
B. Nausea
C. Mental status changes
D. Pruritus
E. Sedation

ANSWER: A

An 82-year-old white male suffers from chronic low back pain. He is on warfarin (Coumadin) for chronic atrial fibrillation, tamsulosin (Flomax) for benign prostatic hyperplasia, and famotidine (Pepcid) for gastroesophageal reflux disease. Which one of the following analgesic medications would have the least potential for adverse side effects?

A. The lidocaine patch (Lidoderm)
B. Hydrocodone/acetaminophen
C. Nortriptyline (Pamelor)D) Duloxetine (Cymbalta)
D. Celecoxib (Celebrex)

ANSWER: A
Topical lidocaine produces very low serum levels of active drug, resulting in very few adverse effects.

A 70-year-old retired engineer who is an avid runner asks you about his slow, progressive decrease in exercise performance. He says he realizes he is getting older but is in good health and is curious as to why this is happening. You tell him that there are multiple physiologic changes associated with aging that lower exercise performance, including a decrease in

A. cardiac output
B. systolic blood pressure
C. pulse pressure
D. residual lung volume

ANSWER: A

Cardiovascular changes associated with aging include decreased cardiac output, maximum heart rate, and stroke volume, as well as increased systolic and diastolic blood pressure.

According to the Beers criteria, a list of drugs that should be avoided in geriatric patients, which one of the following NSAIDs should be avoided in older patients due to its higher rate of adverse central nervous system effects?

A. Indomethacin
B. Ibuprofen
C. Diclofenac sodium
D. Etodolac
E. Celecoxib (Celebrex)

ANSWER: A

In the elderly, the risk of heat wave–related death is highest in those who.

A. have COPD
B. have diabetes and are insulin dependent
C. have a functioning fan, but not air conditioning
D. are homebound

ANSWER: D

An 80-year-old female is being started on warfarin (Coumadin) for atrial fibrillation. According to the American College of Chest Physicians guidelines, the initial dose in this patient should NOT exceed.

A. 2.5 mg
B. 5 mg
C. 7.5 mg
D. 10 mg
E. 12.5 mg

ANSWER: B

An 82-year-old female is hospitalized for pneumonia and sepsis. She has advance directives in place. Should it became necessary, the patient's decision-making capacity is determined by

A. the spouse or next of kin
B. the attending physician
C. a consulting psychiatrist
D. the hospital ethics committee
E. a judge, at the request of hospital social services or the physician

ANSWER: B

A 67-year-old female presents with the inability to smell. She is in good health, and her only medical problem is osteoporosis, treated with alendronate (Fosamax). She says she has no sinus or nasal symptoms. A physical examination is normal including an ear, nose, and throat examination. Which one of the following would be most appropriate at this point?

A. Discontinuing the alendronate
B. An anti-tissue transglutaminase antibody test
C. A serum vitamin D level
D. MRI of the brain

ANSWER: D

Rare tumors involving the olfactory region of the brain can affect smell, and are best detected by MR

An 84-year-old female presents for follow-up of multiple chronic medical problems. She is usually accompanied by her daughter, who lives nearby, but today is brought in by her son and daughter-in-law, who live out of town. They are supportive but are insistent that the patient see a specialist for a problem that she has previously decided not to pursue further. The patient wants to avoid conflict but does not want to see any other physicians. Which one of the following is the most appropriate way to deal with this situation?

A. Speak with the son and daughter-in-law privately
B. Maintain neutrality and avoid triangulation
C. Call the daughter to discuss the situation
D. Try to talk your patient into seeing the specialist
E. Schedule the appointment to appease the family, then cancel it later

ANSWER: B

Most of the gait disturbances identified in geriatric patients in the outpatient primary care setting are related to which one of the following?

A. Sensory ataxia
B. Parkinson’s disease
C. Osteoarthritis
D. Multiple strokes
E. Myelopathy

ANSWER: C

You see a 75-year-old male for his Medicare annual wellness visit. Which one of the following satisfies the Medicare requirement for vision screening?

A. Questioning the patient about vision changes
B. Use of the Amsler grid to detect age-related macular degeneration
C. Use of the Snellen eye chart to evaluate visual acuity
D. Use of an ophthalmoscope to detect cataracts
E. Use of tonometry to detect glaucoma

ANSWER: C

An 80-year-old female who lives independently at home is admitted to the hospital with acute pyelonephritis. When she is taken to her hospital room, she is incontinent, unsteady when walking, and somewhat disoriented. Her past medical history includes hypertension with evidence of diastolic dysfunction on echocardiography and asymptomatic glucose intolerance. Which one of the following orders would be appropriate for this patient?

A. Telemetry
B. Continuous pulse oximetry
C. Foley catheter placement
D. A regular diet
E. Bed rest

ANSWER: D

Interventions recommended for hospitalized older patients to reduce the risk of hospital-induced disability include minimizing restricted diet.

PART &PROMOTION

A 60 years old female with osteoarthritis, smoking shisha went to screen for osteoporosis What to order next?

A. Central dexa
B. Peripheral dexa
C. X-ray
D. Ct hip

ANSWER: A

A 60 years old with 6 months of forgetfulness, insomnia. What is the next step?

A. CBC
B. Fasting blood glucose
C. Thyroid panel
D. Electrolyte panel

ANSWER: C

How to differentiate between Depression & dementia.

A. Acute onset.
B. delusion grandeur.
C. Insomnia.
D. low Memory score.

ANSWER: A

A 66-year-old woman is brought in by her family because of difficulty with memory and disorientation that has worsened over the past 6 months, A careful history and physical examination is performed. Which of the following tests is most appropriate in this patient?

A. Head CT or MRI
B. Lumbar puncture.
C. Rapid plasma reagin (RPR).
D. Electroencephalogram (EEG)

ANSWER: A

Which of the following feature is the 1st sign of Alzheimer disease:

A. Do not recognize family member.
B. Impaired short-term memory
C. Loss of functions of daily activity
D. Ataxic gait

ANSWER: B

Elderly came with his relative and MRI showed cortical atrophy. What is the strongest risk factor for dementia?

A. Age
B. Hypertension
C. Vascular events

ANSWER: A

Optimal daily intake of calcium in elderly?

A. 1000
B. 1200
C. 1500
D. 2000

ANSWER: B

The primary neurotransmitter involved with Alzheimer’s disease is:

A. Acetylcholine
B. Dopamine
C. γ-Aminobutyric acid
D. Norepinephrine
E. Serotonin

ANSWER: A

Bed ridden geriatric patient, how frequent should be rotated on bed, every.

A. 2hr
B. 4hr
C. 6hr
D. 8hr

ANSWER: A

Which of the following is the main feature of dementia of Alzheimer type?

A. Working memory loss.
B. Impairment emotional memory
C. Impairment of learning of new information
D. Impairment episodic memory

ANSWER: C

Which of the following associated with pharmacokinetics old age (geriatric):

A. decrease body fat
B. decrease creatinine clearance
C. hyperalbuminemia
D. increase water in body

ANSWER: B

ABFM:

A 78 year-old male is brought to your office by his daughter. She is concern that her father is no longer attending his weekly cribbage and bingo games, has stopped bathing regularly, and in eating much less. Which one of the following would be most appropriate at this time?

A. Administering the CAGE screening questionnaire
B. Administering the PHQ-9 screening questionnaire
C. A trail of megestrol
D. A trail of nortriptyline (Pamelor)
E. MRI of the brain

ANSWER: B
This elderly patient is exhibiting classic signs of depression. The PHQ-2 has a similar sensitivity to the PHQ-9, but the PHQ-9 has a higher specificity in diagnosing depression (91%–94% compared to 78%–92%) and can assist in diagnosing depression. In addition to the PHQ-2 and PHQ-9 there are specific screening tools for use in the elderly population, including the Geriatric Depression Scale and the Cornell Scale for Depression in Dementia. Somatic issues and dementia can make it more difficult to screen for and diagnose depression in this population. The CAGE questionnaire screens for substance abuse. Megestrol is used to stimulate the appetite, but in this patient the appetite symptoms are likely secondary to depression so treating the depression would be a more appropriate starting point. The tricyclic nortriptyline is used to treat depression but is not first-line therapy, especially in the elderly. In general, a more extensive medical history and a physical examination are indicated before ordering MRI of the brain.

A 78-year-old female with Alzheimer's disease is accompanied to an office visit by her daughter. The daughter has asked to complete an advance directive giving her medical power of attorney. Which one of the following would indicate that the patient lacks capacity to make decisions with regard to completing her medical directive?

A. A dementing illness
B. Inconsistent answers to questions
C. Lack of orientation to time
D. Asking that her son make medical decisions for her instead of her daughter
E. A score of 24/30 on the Mini-Mental State Examination

ANSWER: B
In order for patients to show they have the capacity to make a decision they must demonstrate an understanding of the situation, including the risks, benefits, and consequences of the decision or refusal of care. If a patient gives inconsistent answers to questions after multiple explanations, this indicates that there is a lack of understanding and would meet one of the criteria to determine that the patient lacks the capacity to make that decision. The presence of dementia can be associated with an increased incidence of having a lack of capacity, however, a diagnosis of dementia by itself does not indicate that the patient lacks the capacity to make a decision. While disorientation to time or a lower score on the Mini-Mental State Examination is associated with an increased risk of lacking capacity, these findings alone would not be enough to determine that the patient lacks capacity. The patient asking that her son be her medical decision maker instead of her daughter would not be an indication that she lacks capacity.

An 83-year-old female tells you she has had pain in her knees for the past 15 years, although she has never discussed this problem with you before. After a thorough history and physical examination you diagnose osteoarthritis. Which one of the following would you recommend as the most appropriate first-line treatment to reduce this patient's pain?

A. Vitamin D
B. Glucosamine and chondroitin
C. Low-dose tramadol (Ultram)

D. Corticosteroid injection of the knees
E. Supervised exercise

ANSWER: E

The goals of osteoarthritis therapy are to minimize pain and improve function. The American Academy of Orthopedic Surgery and the American College of Rheumatology have agreed that first-line treatment includes aerobic exercise, resistance training, and weight loss. For patients with osteoarthritis of the knee, supervised exercise was found to reduce pain and improve physical function and quality of life (SOR A). Vitamin D is not currently recommended, and glucosamine and chondroitin are less effective than placebo. Initial pharmacotherapy includes full-strength acetaminophen, or oral or topical NSAIDs. If patients have an inadequate response to these agents' other treatments to consider include tramadol, other opioids, duloxetine, or intra-articular injections with corticosteroids or hyaluronate

You are asked for your advice as part of a committee formed by your local health system to focus on fall prevention. Based on U.S. Preventive Services Task Force recommendations, which one of the following interventions have the strongest evidence for preventing falls in community-dwelling older adults at increased risk for falls?

A. Calcium supplementation
B. Vitamin D supplementation
C. Supportive footwear
D. Exercise classes
E. Cognitive-behavioral therapy

ANSWER: D

In the United States falls are the leading cause of injury-related morbidity and mortality among older adults. The U.S. Preventive Services Task Force (USPSTF) concluded with moderate certainty that exercise interventions provide a moderate net benefit in fall prevention in community-dwelling adults 65 years of age or older who are at increased risk for falls (B recommendation). The USPSTF also concluded with moderate certainty that supplementation with calcium and vitamin D has no clear benefit in preventing falls in older adults. Environmental modifications and psychological interventions lack sufficient evidence for fall prevention.

An 85-year-old female presents to your office to establish care. She has a history of essential hypertension, bilateral osteoarthritis of the knees, depression, and hypothyroidism. The patient feels well and has only mild pain from her osteoarthritis. A recent basic metabolic panel showed a sodium level of 132 mEq/L (N 135–145) but was otherwise unremarkable. A TSH level was 1.07 U/mL (N 0.45–4.50). Which one of the medications in this patient's current regimen is most likely causing the hyponatremia?

A. Acetaminophen
B. Hydrochlorothiazide
C. Levothyroxine (Synthroid)
D. Metoprolol succinate (Toprol-XL)

E. Vitamin D

ANSWER: B

Hyponatremia is an extremely common condition, affecting 4%–7% of the ambulatory population. While a number of medications can cause hyponatremia, among the most common offenders are SSRIs and thiazide diuretics. Acetaminophen and metoprolol are not known to affect sodium levels. Vitamin D deficiency has also been linked to hyponatremia so supplementation would likely improve rather than worsen hyponatremia.

An 88-year-old female hospice patient is experiencing significant agitation and delirium. After attempting conservative treatments and ruling out reversible causes of her symptoms, which one of the following pharmacologic agents would be most appropriate?

A. Alprazolam (Xanax)
B. Amitriptyline
C. Diphenhydramine (Benadryl)
D. Risperidone (Risperdal)

ANSWER: D

Agitation and delirium are common end-of-life symptoms. It is important to assess for treatable causes, including constipation, urinary retention, uncontrolled pain, and adverse medication effects. The antipsychotic medication risperidone is effective for treating agitation and nausea at this stage, but dosing is much lower than when this medication is used for psychiatric disorders. Benzodiazepines can provoke increased agitation and should be used with caution; however, they can be useful for treating significant end-of-life anxiety. Generally, a longer-acting form such as lorazepam would be a better choice than short-acting alprazolam. Amitriptyline and diphenhydramine can both cause urinary retention, potentially leading to delirium and agitation.

An 85-year-old nursing home patient with dementia who has bilateral hearing aids has been slightly more confused over the past 2 weeks according to the staff. He is also speaking at a louder volume than normal. He does not have any pain, but an examination shows impacted cerumen in both ears. Which one of the following would be most appropriate in the management of this patient?

A. No therapy
B. Irrigation of the ears with cold water
C. Use of olive oil drops
D. Removal of the cerumen using peroxide
E. Restraining the patient and attempting manual removal of the cerumen

ANSWER: D

Removal of cerumen should be attempted when the patient has symptoms such as pain, tinnitus, hearing loss, or itching. Removal of the impaction is also indicated in patients who are not able to communicate about their symptoms, such as patients with developmental delay or dementia, a nonverbal patient who has had recent behavioral changes, or children with fever or speech delay. Cerumen impaction resulting in hearing loss can cause reversible cognitive impairment in older persons with dementia. Treatment options include irrigation with warm water, cerumenolytic agents such as carbamide peroxide otic, or manual removal if the patient is cooperative and if the procedure can be completed without the use of restraints. The use of cold water, olive oil drops, ear candling, or cotton-tipped swabs should be avoided.

You see an 89-year-old female with advanced dementia who has stopped eating. The patient's daughter asks you about the role of tube feeding in this situation. You discuss the risks and benefits. In patients with advanced dementia who have a feeding tube placed, there is evidence of Increased

A. nutritional status
B. healing of pressure ulcers
C. quality of life
D. survival
E. emergency department visits

ANSWER: E

Eating problems in patients with advanced dementia are common and include oral dysphagia, pharyngeal dysphagia including aspiration, the inability to feed oneself, and refusal to eat. Patients with these symptoms should be examined for reversible causes such as dental problems. In the absence of a reversible cause, conservative measures such as altering food texture or offering small portions and high-calorie supplements may promote weight gain, although none of these interventions improve function or survival. Tube feeding patients who have advanced dementia has not been compared to hand feeding in randomized, controlled trials. Observational studies have shown no difference in survival, quality of life, nutritional status, functional status, the prevention of aspiration, or the prevention and healing of pressure ulcers between the two groups. Risks associated with feeding tubes include the risks associated with placement of the tube, including the chemical and physical restraint of patients who attempt to remove the tube. Once the tube is in place, tube blockages and dislodgments are common reasons for transfer to an emergency department (ED) for care, and in one study accounted for 47% of all ED visits by nursing home residents with advanced dementia.

A 76-year-old male sees you for a routine health maintenance examination. He says that he has developed a mild tremor over the past few years, and it has now become bothersome to him because it affects his handwriting and his ability to eat in public. His mother had a similar tremor. He has no tremor at rest. When you ask him to hold out his hands, you note a tremor in both hands and wrists. His voice is also somewhat tremulous. He asks if there are any treatments to reduce the tremor. Which one of the following would be the most appropriate next step?

A. Observation only
B. A trial of a -blocker
C. A trial of a dopaminergic agent
D. Serum ceruloplasmin and 24-hour urinary copper excretion levels
E. MRI of the brain

ANSWER: B

This patient presents with symptoms of a benign essential tremor. This is a postural symmetric tremor that is most often noted in the hands and wrists. A positive family history is often present. The diagnosis can be made clinically and a trial of -blockers is warranted, especially since this patient is having significant interference in daily and social activities. A resting tremor would suggest parkinsonism, which warrants treatment with a dopaminergic agent. Young patients presenting with a tremor should be evaluated for Wilson's disease, with ceruloplasmin and urinary copper excretion testing. MRI of the brain would be warranted for a cerebellar tremor, which would manifest as a postural intention tremor.

A 67-year-old male sees you for a Medicare annual wellness visit. He tells you that his best friend had a stroke, and he asks about his risk for stroke. He has no history of stroke, TIA, or neurologic symptoms. He has family history of CVD in his father, who has a MI at age 65 and died from thrombotic stroke at age 71. The patient exercise regularly and has BMI of 27. His only current medical condition is hyperlipidemia, and his cholesterol level is goal on rosuvastatin, 10 mg daily. He also takes aspirin 81mg daily. His BP is 125/78 mm Hg. Based on U.S preventive services task force guidelines, which one of the following would be most appropriate at this time?

A. No additional testing for stroke risk
B. Auscultation for carotid bruits
C. Carotid duplex US
D. MRA
E. CTA for carotid arteries

ANSWER: A

Carotid artery disease affects extracranial carotid arteries and is caused by atherosclerosis. This patient is asymptomatic and has no history of an ischemic stroke, neurologic symptoms referable to the carotid arteries such as amaurosis fugax, or TIA. He has risk factors for cardiovascular disease (age, male sex, hyperlipidemia), but the U.S. Preventive Services Task Force recommends against specific screening for asymptomatic carotid artery stenosis (D recommendation), which has a low prevalence in the general adult population. Stroke is a leading cause of disability and death in the United States, but asymptomatic carotid artery stenosis causes a relatively small proportion of strokes. Auscultation of the carotid arteries for bruits has been found to have poor accuracy for detecting carotid stenosis and is not a reasonable screening approach. Appropriate modalities for detecting carotid stenosis include carotid duplex ultrasonography, magnetic resonance angiography, and computed tomography, but these are not recommended for screening asymptomatic patients.

Polypharmacy increases the risk of adverse health outcomes. According to Choosing wisely campaign adding to a threshold of how many medications in a patient's regimen should prompt a thorough review to determine if any of the medications can be discontinues?

A. 3
B. 5
C. 7

D. 10

ANSWER: B

Polypharmacy, which is defined as regular use of five or more medications, increases the risk of adverse medical outcomes. Patients who take five or more medications can find it difficult to understand and adhere to the complicated regimens. Risk factors for polypharmacy include having multiple medical conditions that are managed by multiple specialist or subspecialist physicians, residing in a long-term care facility, having poorly updated medical records and using automated refill services. Inappropriate prescribing of drugs that are not discontinued after their usual effective or recommended period is known as legacy prescribing and can contribute to inappropriate polypharmacy. According to the Choosing Wisely campaign, any prescriptions beyond a threshold of five medications should trigger a thorough review of the patient's complete regimen, including over-the-counter medications and dietary supplements, to determine if any of the medications can be discontinued. Tools such as the Beer's criteria list and the Medication Appropriateness Index can be used to identify potentially inappropriate medication use, but no single tool or strategy has been determined to be superior. If discontinuation of particular high-risk medications is not possible because of medical conditions, then dose reductions should be considered.

An 86 year-old male is brought to your office by his daughter for follow-up of HTN. His BP is well controlled on amlodipine 5mg daily. His daughter is concerned about the safety of her father driving because he has become confused on several occasions. He tells you that he only drives short distances to familiar places during the daytime, and he is somewhat agitated that his daughter mentioned this topic. He has no cognitive defects noted on a 3-items recall or a clock drawing test, neurologic and MSK examinations reveal no deficits.
Which one of the following would be most appropriate next step in management?

A. No further interventions
B. Discontinue amlodipine
C. Reinforcing safe driving practices with education on age-related changes that may affect safe driving
D. Recommending that he stop driving and surrender his license

ANSWER: C

This patient is over the age of 85 and at higher risk for a motor vehicle crash. He has shown that he has good insight and has made safety changes to his driving. Reinforcing safe driving practices would be appropriate at this time. An assessment of his driving safety, including vision and hearing evaluations, would also be appropriate. His blood pressure is well controlled, so amlodipine should be continued. Physicians can recommend that a patient stop driving, but consideration should be given to the social and emotional implications. This patient does not have any medical concerns that would necessitate a recommendation to stop driving or surrender his license.

A 79-year-old male presents to your primary care clinic as a new patient. He is unaccompanied and tells you that he has no acute concerns and takes no regular medications, but just 'needed a doctor.'' He is a retired lawyer and states that he lives alone. He has no significant past medical history but you are able to access his electronic medical records and note that he has a history of diabetes mellites and hypertension, and has been to the local emergency department (ED) twice in the last 4 months for headaches. A workup from the ED was notable only for moderately elevated blood pressure. When asked, he does not appear to recall these visits. His vital signs are notable only for a blood pressure of 165/90 mm Hg. A physical examination reveals a thin but well appearing older adult who is mildly disheveled in appearance, with no other abnormalities. Which one of the following would be the most appropriate next step in the care of this patient?

A. A cognitive assessment
B. Immediate referral to adult protective services
C. Immediate referral to a neurologist
D. Immediate referral to a psychiatrist

ANSWER: A

This patient's history and the physical examination are concerning for features of self-neglect. At this point in the evaluation, the etiology of this possible self-neglect remains unclear. A formal cognitive evaluation, using the Mini-Cog, the full Mini-Mental State Examination, the Montreal Cognitive Assessment, or a similar tool, is recommended to evaluate for objective findings of impairment that may match the subjective concerns. The primary care clinician is responsible for this initial evaluation, given the patient's presence in the clinic and clear safety concerns. The advisability of immediate referrals to adult protective services or to subspecialists may depend on the findings of this initial evaluation. In addition to a cognitive assessment, the primary care clinician may also consider formal depression screening with a Patient Health Questionnaire–9 (PHQ-9), Geriatric Depression Scale, or similar tool.

A 74 year-old male with type 2 diabetes, severe peripheral artery disease, and a history of tobacco use is admitted to the hospital with wet gangrene of his right foot that does not improve with appropriate wound care and antibiotics. His vascular surgeon recommends a below the knee amputation of the right leg, but the patient has not given a consent.

Which one of the following would suggest that this patient lacks capacity to make this decision?

A. He has a fear of having surgery
B. He wants to consult with his family first
C. He consistently believes that his foot will improve
D. He understands that he may die if he foregoes the amputation
E. He states that his brother had the same surgery and died a week later

ANSWER: C

Capacity to make a medical decision requires that a patient understands the risks, benefits, and alternatives to a specific treatment recommendation. If a patient can express an understanding of the medical situation, including the consequences of either proceeding or declining a recommended treatment, and a rational, consistent reason for this, then the patient is typically thought to have capacity to make a medical decision. When the patient makes statements that are inconsistent with the expected clinical course, then capacity should be assessed by a formal process and documented in the medical record. This patient stating consistently that he believes his foot will improve does not reflect the expected clinical course and should trigger a formal assessment for capacity. However, statements that are consistent with the clinical course, such as concerns regarding fears or previous experiences, wanting to consult with his family first, or the patient understanding that he may die if he forgoes the amputation, are not by themselves an indication that he lacks capacity to make a medical decision.

An 80 year-old male is considering a cardiac procedure. As part of the evaluation for the procedure he is found to meet the criteria for being at risk of frailty(prefrail). Which one of the following would be the most effective management of this patient's prefrail status?

A. Nutritional supplementation
B. Vitamin D supplementation
C. Testosterone supplementation
D. A physical activity programs
E. Cognitive behavioral therapy

ANSWER: D

Adults who are diagnosed as either prefrail or frail should be considered for a multicomponent physical activity program. This strategy is graded as a strong recommendation with moderate certainty of evidence by the International Conference on Frailty and Sarcopenia Research (ICFSR). Frailty is an important geriatric syndrome representing a state of increased vulnerability to adverse health outcomes. Current assessment criteria divide patients into not-frail, prefrail (at risk of frailty), and frail. It is important for clinicians to understand that this is not simply the aging process. It is a dynamic process in which a patient can transition between levels, worsening, improving, or maintaining the current state. Nutritional or protein supplementation may be considered in conjunction with the physical activity program. This is a conditional grade recommendation with a low certainty of evidence according to the ICFSR. Vitamin D supplementation in the absence of a documented deficiency, hormone therapy, and cognitive-behavioral or problem-solving therapy are not recommended for frailty by the ICFSR.

When performing a geriatric assessment, which one of the following is an instrumental activity of daily living?

A. Bathing
B. Dressing
C. Transferring between the bed and a chair.
D. Using the telephone
E. Using the toilet

ANSWER: D

The foundation of geriatric assessment is assessing the individual's ability to perform tasks required for living. Activities of daily living are self-care activities that are performed daily, such as eating, bathing, dressing, transferring between the bed and a chair, and toileting, including bladder and bowel function. Instrumental activities of daily living include activities necessary to live independently, such as using a telephone, doing housework, preparing meals, taking medications properly, and managing finances

A 73-year-old female sees you for the first time for a health maintenance visit. Her medical history includes hyperlipidemia, GERD, insomnia, and osteoarthritis, but she is otherwise healthy. Her estimated 10-year risk of atherosclerotic cardiovascular disease is 14%. She lives independently. She has a past history of alcohol abuse but has not used alcohol in 20 years and is a lifetime nonsmoker. Her current medication regimen includes aspirin, 81 mg once daily; melatonin, 3 mg at bedtime; acetaminophen, 500 mg three times daily; atorvastatin (Lipitor), 20 mg once daily; and famotidine (Pepcid), 20 mg once daily. Today her blood pressure is 130/70 mm Hg, pulse rate 72 beats/min, and oxygen saturation 95% on room air. Which one of the following changes to her current medication regimen would improve the likelihood of benefit and reduce the likelihood of harm?

A. Stopping aspirin
B. Stopping melatonin
C. Stopping acetaminophen and starting diclofenac, 50 mg twice daily
D. Stopping atorvastatin and starting rosuvastatin (Crestor), 40 mg at bedtime
E. Stopping famotidine and starting omeprazole (Prilosec), 20 mg once daily

ANSWER: A

This patient is generally healthy and highly functional at baseline. She has multiple medical problems but they are unlikely to significantly reduce her longevity. She has no known history of cardiovascular or cerebrovascular disease, so aspirin was being used for primary prevention. The U.S. Preventive Services Task Force (USPSTF) has stated that there is insufficient evidence to recommend for or against the use of aspirin for primary prevention of cardiovascular disease in adults over the age of 70. Since the USPSTF guidelines were published, evidence from two large randomized, controlled trials provided strong support for the discontinuation of aspirin 19 for most older adults without prior cardiovascular disease, with an indication that it increases the risk of all- cause mortality. In this patient at low to moderate risk who is already taking a statin, the risk of continuing aspirin exceeds the potential benefit. There is no indication for changing this patient from a moderate- intensity to a high-intensity statin. For uncomplicated gastric reflux in older adults, H2-blockers are preferred over proton pump inhibitors, which are associated with an increased risk of infections and fractures. This patient has no concerns about osteoarthritis, and although she has a remote history of alcohol abuse, her dosing of daily acetaminophen is well below the threshold of concern for liver injury. Switching to an NSAID such as diclofenac would place her at risk for short-term and long-term renal complications. Melatonin is not known to have long-term adverse effects in older adults.

The U.S. Preventive Services Task Force recommends screening for depression for:

A. All adults
B. All women but not men
C. Only adults with a family history of depression
D. Only adults with a known personal history of depression
E. Only adults with a history of disability, medical illness, complicated grief, chronic sleep disturbance, and/or loneliness

ANSWER: A

Currently the U.S. Preventive Services Task Force recommends that all adults should be screened for depression, as it is one of the leading causes of disability in persons older than 15 years of age (B recommendation). The optimal interval is yet to be defined. Depression is more common in women, but screening is recommended for all adults. While a family history of depression, a personal history of depression, disability, medical illness, grief, sleep disturbance, and loneliness are all risk factors for depression, these factors do not need to be present to screen

A 62-year-old female sees you for a routine health maintenance examination. She has a history of breast cancer diagnosed 6 years ago that was treated with lumpectomy, radiation, and endocrine therapy. She is feeling well today and has no symptoms of concern. There is no family history of breast, ovarian, colon, or prostate cancers. In addition to mammography, which one of the following annual tests would improve this patient's chance of survival?

A. No tests
B. CT of the chest
C. MRI of the breast
D. Breast ultrasonography
E. A bone scans

ANSWER: A

Breast cancer, the most common non-cutaneous malignancy among women, has a 5-year survival rate of almost 90%, so medical care of such patients is increasingly common. To help provide guidance to primary care physicians, the American Cancer Society and the American Society of Clinical Oncology published them joint Breast Cancer Survivorship Care Guideline in 2016. This guideline includes a recommendation for annual mammography for women with prior treatment for breast cancer to screen for local recurrence or a new primary breast cancer. 22 MRI is not recommended in the absence of specific high-risk criteria such as a BRCA mutation. Similarly, other imaging modalities such as ultrasonography are not recommended in the absence of symptoms. Imaging is not indicated to screen for metastatic disease. Though breast cancer most commonly metastasizes to the lung, bone, and liver, there is no evidence that screening CT or a bone scan provides mortality or quality-of-life benefits

A 45-year-old female sees you for the first time for a health maintenance examination. She has a 20-pack-year history of smoking. She has been sexually active with women only, has been in a monogamous relationship for 15 years, and has never been pregnant. A Papanicolaou smear 2 years ago was normal. She was tested 15 years ago for syphilis and hepatitis B with negative results. She has not had any other screening tests for sexually transmitted infections. Which one of the following screenings would be appropriate for this patient?

A. Bacterial vaginosis
B. Chlamydia trachomatis and gonorrhea
C. HIV
D. HPV
E. Syphilis

ANSWER: C

According to the CDC, all individuals between 13 and 64 years of age should be tested at least once for HIV. Although bacterial vaginosis is more common in women who have sex with women (WSW), screening is not recommended by the CDC. Screening for Chlamydia trachomatis and gonorrhea is appropriate for women younger than 25 years of age and for women at risk, including those with new partners, multiple partners, or a new partner with a sexually transmitted infection. This patient is >25 years of age and does not have any additional risk factors. The U.S. Preventive Services Task Force recommends screening for cervical cancer with cytology every 3 years or cytology and HPV co- testing every 5 years for women 30–65 years of age. This patient's Papanicolaou test was normal 2 years ago. Annual syphilis screening is appropriate for men who have sex with men but is not indicated for WSW

Your practice is starting a screening program for depression. Which one of the following is a cardinal symptom of depression included in the Patient Health Questionnaire–2 (PHQ-2) screening instrument?

A. Fatigue
B. Lack of appetite
C. Little interest or pleasure in doing things.
D. Restlessness
E. Sleep disturbance

ANSWER: C

The two cardinal symptoms of depression are depressed mood and anhedonia. These are the two criteria in the Patient Health Questionnaire–2 (PHQ-2) screening instrument for depression. A positive result on the PHQ-2 should prompt further evaluation, including questions about other symptoms such as energy level, appetite changes, sleep disturbance, psychomotor changes, and suicidality

A 72-year-old male comes to your office for an annual health maintenance visit. He mentions that some of his friends recently underwent health screenings, and he asks 54 if there are any cardiovascular screening tests recommended for him. His blood pressure is well controlled, and he does not have any shortness of breath or chest pain. He exercises regularly. He started smoking cigarettes while he attended college but quit at age 25. He does not have a significant family history of cardiovascular disease. Which one of the following tests is recommended by the U.S. Preventive Services Task Force for patients such as this?

A. An ankle-brachial index
B. A high-sensitivity C-reactive protein level
C. A coronary artery calcium score
D. Abdominal aortic aneurysm screening with ultrasonography
E. Echocardiography

ANSWER: D

This patient is male, over the age of 65, and smoked in the past, so he meets the criteria for onetime screening for an abdominal aortic aneurysm (AAA) recommended by the U.S. Preventive Services Task Force (USPSTF) (B recommendation). This screening is associated with decreased AAA-related mortality. The USPSTF found insufficient evidence for screening asymptomatic adults for cardiovascular disease with an ankle-brachial index, high-sensitivity C-reactive protein level, or coronary artery calcium score. Screening asymptomatic individuals with echocardiography are not recommended at this time

A 50-year-old female sees you for the first time. She is active and has not seen a physician for 2 years. The last vaccine she received was Tdap following the birth of her granddaughter 2 years ago. She has a past history of essential hypertension and hyperlipidemia, but her medical history is otherwise unremarkable. Based on CDC guidelines, which one of the following vaccines should you recommend for this patient today?

A. HPV
B. Pneumococcal conjugate (PCV13, Prevnar 13)
C. Pneumococcal polysaccharide (PPSV23, Pneumovax 23)
D. Live zoster (Zostavax)
E. Recombinant zoster (Shingrix)

ANSWER: E

Based on current CDC guidelines, this patient should receive the recombinant herpes zoster vaccine. It is the preferred vaccine for the prevention of herpes zoster due to much higher efficacy than the live zoster vaccine. The live vaccine is considered a second-line option and should not be administered before the age of 60. HPV vaccine is not indicated in this age group (>45 years). Pneumococcal polysaccharide vaccine (PPSV23) is recommended for adults 65 years of age. Patients who are 65 and older can discuss with their physician whether they should receive pneumococcal conjugate vaccine (PCV13). Immunocompromised patients may sreceive both pneumococcal vaccines prior to age 50.

The U.S. Preventive Services Task Force recommends which one of the following for breast cancer screening?

A. Annual screening mammography for women ages 40–75
B. Annual screening mammography for women ages 50–75
C. Biennial screening mammography for women ages 35–75
D. Biennial screening mammography for women ages 50–75
E. Biennial screening mammography for women ages 45–50 and annual screening mammography for women aged 51–75

ANSWER: D

Current U.S. Preventive Services Task Force guidelines for breast cancer screening recommend biennial screening mammography for women ages 50–75 (B recommendation). Biennial screening mammography can be considered for women aged 40–49 after discussing the risks and benefits with the patient (C recommendation)

A 65-year-old female comes to your office for her Welcome to Medicare visit. Her current medication regimen includes losartan (Cozaar), 50 mg daily, for hypertension: oxybutynin, 5 mg daily, for overactive bladder; doxepin, 5 mg at night, for depression and insomnia; and atorvastatin (Lipitor), 10 mg daily, for hyperlipidemia. She is doing well on her current medications and is requesting refills today. You advise her that the benefits of her current regimen for her overactive bladder and depression 84 need to be weighed against her increased risk of:

A. Cirrhosis
B. Dementia
C. Parkinson's disease
D. Peripheral vascular disease
E. Pulmonary fibrosis

ANSWER: B

The use of anticholinergic medications and other sedatives has been prospectively linked to an increased risk of dementia. Treatment of overactive bladder and depression could include anticholinergics, which can be inadvertently combined with over-the-counter medications such as chlorpheniramine. Alternative medications should be considered for older patients when possible. There is no association between the use of anticholinergic agents and cirrhosis, Parkinson's disease, peripheral vascular disease, or pulmonary fibrosis.

A 46-year-old male presents to your office and asks you to screen him for pancreatic cancer. He tells you that his best friend was recently diagnosed with pancreatic cancer at age 45. His friend was previously healthy and had no family history of cancer. The patient is doing well and has no symptoms. He does not have a family history of cancer. Based on U.S. Preventive Services Task Force recommendations, which one of the following would be most appropriate at this time?

A. No screening
B. Ultrasonography of the abdomen
C. CT of the abdomen without contrast
D. CT of the abdomen with contrast
E. MRI of the abdomen

ANSWER: A

Although an uncommon cancer, pancreatic cancer is the third most common cause of cancer death in the United States. The incidence is rising, and it is estimated that it may soon become the second- leading cause of. cancer deaths. In an asymptomatic patient with no family history of pancreatic cancer or inherited genetic syndromes, the U.S. Preventive Services Task Force recommends against screening for pancreatic cancer (D recommendation).

The U.S. Preventive Services Task Force recommends which one of the following for prevention of falls in community-dwelling adults 65 years of age who are at increased risk for falls?

A. Empirical vitamin D supplementation
B. Psychological evaluation and treatment programs
C. In-home environmental evaluation and modification
D. Regular participation in an exercise program

ANSWER: D

The U.S. Preventive Services Task Force (USPSTF) recommends exercise interventions to prevent falls in community-dwelling adults 65 years of age who are at increased risk for falls (B recommendation). This recommendation is based on several studies that demonstrated improved fall-related outcomes for individuals from this population who participated in exercise programs. Strength and resistance exercises were specifically identified as beneficial. The evidence exists to support group-based exercises is less convincing. It is also recommended that clinicians selectively offer multifactorial interventions to prevent falls in this population, based on the possible small benefit and minimal risk (C recommendation). The USPSTF recommends against vitamin D supplementation to prevent falls in community-dwelling adults 65 years of age with the caveat that this applies only to those who are not known to have osteoporosis or vitamin D deficiency (D recommendation)

An 84-year-old male nursing home resident with dementia is noted to have a weight loss of about 5% in the past 6 months. Which one of the following would be most appropriate?

A. Avoiding dietary restrictions
B. An appetite stimulant
C. Vitamin B12 , vitamin D, and selenium supplements
D. An omega-3 fatty acid supplement
E. Tube feeding

ANSWER: A

Effective interventions for weight loss in nursing home patients include providing meals in a pleasant, homelike environment. Avoiding dietary restrictions has low quality evidence of effectiveness. There is high quality evidence that initiating tube feedings in patients with severe dementia is not only ineffective but may lead to problems such as decubitus ulcers and aspiration. There is low to very low evidence of the effectiveness for prescribing appetite stimulants, selenium, vitamin B, or vitamin D supplements unless there is a documented deficiency. Neither quality of life nor survival is improved.

A 52-year-old female sees you because of concerns about developing lung cancer. She reports that she quit smoking last month after learning that her father has stage IV lung cancer. She had smoked a pack of cigarettes per day since she was 18 years old. She has no history of cough, shortness of breath, or weight loss. She is worried about developing lung cancer and wants to know how to “catch it early.” Based on the recommendations of the U.S. Preventive Services Task Force, in addition to providing ongoing smoking cessation support, which one of the following should you recommend?

A. A chest radiograph today

B. Low-dose chest CT today
C. Low-dose chest CT at age 55
D. No imaging, since she has already quit smoking
E. No imaging, since she is female

ANSWER:C

The 2013 U.S. Preventive Services Task Force lung cancer screening guidelines recommend annual low-dose CT screening for all adults between the ages of 55 and 80 who have a 30-pack-year smoking history and either currently smoke or have smoked within the past 15 years (B recommendation

A 60-year-old female has recently moved to your area from another state and sees you to establish care. Her past records are not available at the time of her visit, but she has a history of ER+/PR+ breast cancer diagnosed 2 years ago. She was treated with lumpectomy, radiation, and chemotherapy. She does not have any current symptoms and there are no family history of breast or ovarian cancer. Her last visit with a physician was 6 months ago. She had a mammogram at that time. A breast MRI was done at the time of her cancer diagnosis. Her last Papanicolaou (Pap) test was normal 1 year ago. Which one of the following should be performed at this time?

A. A history and physical examination only
B. A Pap test
C. Mammography
D. Breast MRI
E. Echocardiography

ANSWER: A

Breast cancer survivors should undergo a history and physical examination every 3–6 months for the first 3 years after treatment, then every 6–12 months for the next 2 years, and then annually thereafter (SOR C). Papanicolaou testing guidelines do not change for patients with a history of breast cancer. Screening should be repeated every 3–5 years according to American Society for Colposcopy and Cervical Pathology (ASCCP) guidelines. Mammograms of both breasts or the remaining breast are recommended no more often than yearly (SOR A). Breast MRI is not recommended on a regular basis unless the patient has a high risk of recurrence, a significant family history of breast or ovarian cancer, or a personal history of Hodgkin’s disease (SOR C). While it is important to be alert for signs of cardiotoxicity due to prior chemotherapy, echocardiography is indicated only if the patient has cardiac symptoms. Routine echocardiography is not recommended (SOR C)

A 79-year-old female comes to your office with her daughter to discuss concerns about the mother's endurance. The daughter thinks her mother is losing strength more quickly than she should. The patient’s past medical history includes osteoporosis and hypertension. She is using a cane when needed for support but has not fallen. She is not sleeping well, and her insomnia seems to have worsened over the last year. They both agree she is not depressed, and her PHQ-2 score today is 0. After a discussion with the patient and her daughter and a physical examination, you are concerned that the patient is at risk for frailty-related health outcomes. Which one of the following interventions would you recommend as most important to improve this patient’s health outcomes and physical function?

A. Aerobic exercise
B. Resistance training
C. Nutritional counseling
D. Vitamin D
E. Mirtazapine (Remeron)

ANSWER: B

Frailty is an increasingly common problem in the geriatric population, especially as individuals are living longer. The current literature supports resistance training to improve physical function before aerobic exercise is introduced. Although there was hope that nutritional counseling would improve outcomes, it does not seem to have an effect. Vitamin D supplementation also does not improve outcomes in these individuals. Mirtazapine is on the Beers list, and without a compelling indication such as weight loss with depression it should be avoided in the elderly.

Which one of the following is the greatest risk factor for abdominal aortic aneurysm (AAA)?

A. Male sex
B. Female sex
C. White race
D. A long duration of smoking
E. Having a first degree relative with an AAA

ANSWER:D

The following factors have been found to increase the risk for developing an abdominal aortic aneurysm (AAA): a history of smoking, advanced age, above-average height, having a first degree relative with an AAA, a personal history of atherosclerosis, high cholesterol levels, and hypertension. Smokers have seven times greater risk of developing an AAA compared with nonsmokers. This single factor outweighs all of the other risk factors except age. Although women are less likely to develop an AAA, they have a 2–3 times greater chance of an AAA rupturing if it is present. In addition to significantly increasing the risk for AAA development, current smoking increases the risk for further AAA expansion and rupture. Epidemiologic studies suggest that the duration of smoking influences the risk for AAA significantly more than the total number of cigarettes smoked. The U.S. Preventive Services Task Force currently recommends one-time screening for AAA in males between the ages of 65 and 75 who have ever smoked (B recommendation). There was not enough evidence to determine the risk and benefits of screening females with the same risk factors (I recommendation).

An 85-year-old male with mild dementia, stage 4 chronic kidney disease, and insulin-dependent diabetes mellitus has received a letter from his gastroenterologist stating that he is due for his next colonoscopy. He had a normal colonoscopy 10 years ago and has no known high-risk indications for surveillance beyond those recommended for the general public. Proceeding with a screening colonoscopy at this time is an example of

A. compliance with recommended guidelines
B. appropriate modification of recommended guidelines
C. over screening
D. overdiagnosis
E. overtreatment

ANSWER:C

Over screening is defined as the use of screening tests at ages younger or older than the range recommended by national guidelines or at shorter intervals than recommended. Current guidelines from the U.S. Preventive Services Task Force recommend screening for colon cancer starting at age 50 and continuing until age 75 (A recommendation). The decision to screen adults 76–85 years of age should be an individual one, taking into account the patient's overall health and prior screening history (C recommendation). In this case ordering a screening colonoscopy would be an example of over screening because the patient is above the recommended upper age of 75 and he has multiple comorbid conditions that limit his life expectancy. Over screening can result in increased cost, morbidity, and/or mortality, especially in older individuals. Overdiagnosis is when a diagnosis is made correctly, but the diagnosis is irrelevant because it will never cause symptoms or death during a patient's ordinarily expected lifetime. Overtreatment refers to unnecessary medical interventions

You are administering a mental status examination to a 92-year-old male with suspected dementia. You give the patient a pencil and ask him to show how it is used. He gives you a bewildered look and eventually puts the pencil in his mouth and demonstrates using it as a toothbrush. This task assesses

A. executive functioning
B. gnosia
C. orientation
D. praxis
E. visuospatial proficiency

ANSWER: D

Praxis is the ability to carry out intentional motor acts and is commonly assessed by giving the patient a common object such as a hairbrush or pencil and asking the patient to show how it is used. A patient unable to carry out such motor acts is referred to as having apraxia (SOR C). Several other common components of the cognitive assessment will be impaired in persons with dementia. Executive functioning is the ordering and implementation of cognitive functions necessary to engage in appropriate behavior and is often assessed by asking a patient to draw a clock with the hands set at a certain time. Gnosia is the ability to name objects and their function and is often assessed by showing a patient a common object such as a pen, watch, or stethoscope and asking whether he or she can identify it and describe how it is used. Orientation is the ability of the patient to recognize his or her place in time and space. Orientation is commonly assessed by asking a patient the date, the current location, his or her name, and his or her place of. birth. Visuospatial proficiency is the ability to perceive and manipulate objects and shapes in space. It is often assessed by asking the patient to copy intersecting pentagons or a three-dimensional cube on paper

A 77-year-old white male tells you he has had urinary incontinence for more than a year. The incontinence occurs with sudden urgency. No association with coughing or positional change has been noted, and there is no history of fever or dysuria. He underwent transurethral resection of the prostate (TURP) for benign prostatic hyperplasia a year ago, and he says his urinary stream has improved. A rectal examination reveals a smoothly enlarged prostate without nodularity, and normal sphincter tone. No residual urine is found with post-void catheterization. Which one of the following is the most likely cause of this patient's incontinence?

A. Detrusor instability
B. Urinary tract infection
C. Overflow
D. Fecal impaction
E. Recurrent bladder outlet obstruction

ANSWER: A

In elderly patients, (urge incontinence) detrusor instability is the most common cause of urinary incontinence in both men and women. Become worse after surgical relief of obstructive prostatic hypertrophy.

A staff member at a local assisted living facility calls you about an 88-year-old female who has chronic urinary incontinence and well-controlled hypertension. A urinalysis was obtained after the patient reported some dizziness and malaise. She does not have dysuria and has had no change to her incontinence. The patient is afebrile and other vital signs are normal. The urine culture reveals >100,000 colony-forming units of Escherichia coli, with sensitivities pending. In addition to supportive care and hydration, which one of the following would be indicated at this time?

A. Ciprofloxacin (Cipro)
B. Fosfomycin (Monurol)
C. Nitrofurantoin (Macrodantin)
D. Trimethoprim/sulfamethoxazole (Bactrim)
E. No antibiotics

ANSWER: E

In women aged 70 and older the incidence of asymptomatic bacteriuria is 16%–18%, and in chronically incontinent and disabled older adults' rates may reach 43%.

A 72-year-old female who remains very active and engaged in the community comes to your office concerned by urinary symptoms that disrupt her life. She reports that she often has a strong, abrupt desire to void that frequently causes her to leak urine involuntarily. She also reports occasional episodes of urinary frequency and nocturia. Which one of the following is the first-line treatment for her condition?

A. Anticholinergic drugs such as oxybutynin or solifenacin (Vesicare)
B. 6-Adrenergic agonists such as mirabegron (Myrbetriq)
C. Duloxetine (Cymbalta)

D. Bladder training
E. A pessary

ANSWER: D

An 88-year-old male nursing-home patient is having problems with constant overflow incontinence. Intermittent catheterization has proven difficult due to urethral obstruction and his resistance to such procedures. He has dementia and generalized weakness as a result of multiple strokes and is bedbound, requiring total care for most activities of daily living. Examination shows a grade 3 coccygeal ulcer that has been present for several months, and a digital rectal examination demonstrates a large, irregular prostate. Which one of the following is the best choice to quickly correct his incontinence?

A. Doxazosin (Cardura)
B. Finasteride (Proscar)
C. Tolterodine (Detrol)
D. Long-term indwelling Foley catheter placement
E. Referral for transurethral prostatectomy

ANSWER: D
While it would increase the risk of urinary infection, indwelling catheter placement is most likely to provide immediate relief of this patient’s urinary retention.

You see a 78-year-old male in the hospital the day after his hip-replacement surgery. He has not voided in the past 12 hours. A urethral catheter is placed, and 500 mL of urine is removed from his bladder. Which one of the following is most likely to improve the success rate of a voiding trial?

A. Using a specialized catheter coude instead of a standard catheter
B. Leaving the catheter in place for at least 2 weeks
C. Immediately removing the catheter to prevent a urinary tract infection
D. Starting tamsulosin (Flomax), 0.4 mg daily, at the time of catheter insertion
E. Starting antibiotic prophylaxis at the time of catheter insertion

ANSWER: D
Urinary retention is a common problem in hospitalized patients, especially following certain types of surgery.

Antidepressants:

Which one of the following antidepressants should be avoided in the elderly?

A. Bupropion (Wellbutrin)
B. Sertraline (Zoloft)

C. Mirtazapine (Remeron)
D. Paroxetine (Paxil)
E. Venlafaxine

ANSWER: D

Guidelines recommend several antidepressant agents as good first-line options, including venlafaxine, bupropion, and mirtazapine. Among the SSRIs, citalopram, escitalopram, and sertraline are all good choices, but paroxetine is associated with more anticholinergic effects and should be avoided

You are initiating pharmacologic therapy for a 75-year-old patient with depression. Which one of the following would be most appropriate for this patient?

A. Amitriptyline
B. Escitalopram (Lexapro)
C. Imipramine (Tofranil)
D. Paroxetine (Paxil)

ANSWER: B

An 87-year-old female is brought to the emergency department after losing consciousness at the dinner table. Her history indicates recent unintentional weight loss. Further evaluation ultimately reveals a large mass at the head of the pancreas and extensive metastasis to numerous organs, including the brain. Her life expectancy is estimated to be 2–3 weeks. The patient chooses to receive hospice care but becomes very depressed. Which one of the following would be best for improving her depression?

A. Electroconvulsive therapy
B. Methylphenidate (Ritalin)
C. Mirtazapine (Remeron)
D. Fluoxetine (Prozac)
E. Nortriptyline (Pamelor)

ANSWER: B

There is good evidence that psychostimulants reduce symptoms of depression within days, making methylphenidate a good choice for this patient (SOR B). Electroconvulsive therapy is contraindicated due to her brain lesions. Mirtazapine, fluoxetine, and nortriptyline all take at least 3–4 weeks to have any antidepressant effects.

A 60-year-old male smoker has lung cancer, and a life expectancy of 4–6 months. His wife is concerned about his state of mind and requests medication for him. His cancer-related pain is generally controlled. When evaluating the patient, which one of the following features would be more characteristic of depression as opposed to a grief reaction?

A. Insomnia
B. Loss of interest or pleasure in all activities
C. Feelings of guilt
D. Thoughts of wanting to die
E. Psychomotor agitation

ANSWER: B

An 85-year-old male is brought to your office by his family because they are concerned that he may be depressed. Which one of the following is most likely in a depressed patient in this age group?

A. Suicidal ideation
B. Somatic symptoms
C. Depressed mood
D. Preoccupation with guilt

ANSWER: B

An obese 70-year-old male with chronic pain due to osteoarthritis complains of fatigue, anhedonia, hypersomnolence, and increased appetite. Which one of the following would be the best pharmacologic agent for this patient?

A. Duloxetine (Cymbalta)
B. Mirtazapine (Remeron)
C. Citalopram (Celexa)
D. Paroxetine (Paxil)
E. Nortriptyline (Pamelor)

ANSWER: A
The best pharmacologic agent for this patient is duloxetine, as it is indicated for both depression and chronic pain and is unlikely to cause weight gain. And tricyclic antidepressant nortriptyline is on the Beers list of drugs not recommended for elderly patients.

A 75-year-old male consults you after his family expresses concern about his loss of interest in his usual activities. They believe he has become increasingly withdrawn since the death of his wife 8 months earlier. You note he has lost 8 kg (18 lb) since his last office visit 6 months earlier. He does not drink alcohol. His physical examination is unremarkable for his age except for a blood pressure of 105/70 mm Hg. Detailed laboratory studies, including thyroid function tests, are all within normal limits. He tells you he would be fine if he could just get some sleep. His Mini-Mental State Examination is normal, but he is obviously clinically depressed. The most appropriate medication for his depression would be.

A. trazodone (Oleptro)
B. mirtazapine (Remeron)
C. bupropion (Wellbutrin)
D. amitriptyline
E. nortriptyline (Pamelor)

ANSWER: B

Mirtazapine has serotonergic and noradrenergic properties and is associated with increased appetite and weight gain. It may be particularly useful for patients with insomnia and weight loss.

A 77-year-old male presents for a periodic health evaluation. Your practice is organized as a patient centered medical home, and this is the patient's initial visit. His records indicate that he received all. recommended screening tests and immunizations 4 years ago, and he asks what screening tests are necessary at his age. The U.S. Preventive Services Task Force recommends that this patient be screened for which one of the following?

A. Prostate cancer
B. Colorectal cancer
C. Abdominal aneurysm
D. Dementia
E. Depression

ANSWER: E

Dementia:

While making rounds at a nursing home you see a 70-year-old female with dementia. The staff tells you that she has recently developed serious aggressive behaviors that include lashing out physically at caregivers on a regular basis. Nonpharmacologic interventions have not curbed her violent outbursts. Your evaluation does not reveal any treatable underlying conditions. After a conversation about risks and benefits with her family and the nursing home staff, which one of the following would you recommend for this patient?

A. Diphenhydramine (Benadryl)
B. Aripiprazole (Abilify)
C. Clonazepam (Klonopin)
D. Mirtazapine (Remeron)
E. Ziprasidone (Geodon)

ANSWER: B

An 85-year-old female with advanced Alzheimer's disease is brought to your office for treatment of agitation, aggressive behavior, and delusions. Behavioral and psychological interventions have had little success and the family are willing to try medications because they prefer to keep the patient at home. Which one of the following would most likely help control this patient's symptoms?

A. Alprazolam (Xanax)
B. Aripiprazole (Abilify)
C. Clozapine (Clozaril)
D. Donepezil (Aricept)
E. Haloperidol

ANSWER: B
Nonpharmacologic interventions are the first-line treatment for patients with behavioral and psychological symptoms of dementia. Be aware that the use of atypical antipsychotics for behavioral symptoms of dementia is associated with increased mortality.

An 84-year-old female with severe dementia due to Alzheimer's disease is a resident of a long-term care facility. She has been hitting the staff while receiving personal care and recently had an altercation with another resident. Behavioral interventions have been unsuccessful in managing her symptoms and you suggest to the patient's family that she be started on low-dose risperidone (Risperdal). They ask about. appropriate use of the drug and the potential for side effects. Which one of the following would be appropriate advice?

A. Extrapyramidal side effects are more common compared to typical antipsychotics
B. Dementia-related psychosis is an FDA-approved indication
C. No monitoring will be necessary
D. The risk of diabetes mellitus is decreased
E. The risk of mortality is increased

ANSWER: E
Both typical and atypical antipsychotics increase the risk of mortality in patients with dementia. The FDA has a black box warning on these medications, including risperidone, about the increased risk of mortality in patients with dementia. Risperidone is not approved by the FDA for dementia-related psychosis. The typical antipsychotics are more commonly associated with extrapyramidal side effects. Diabetes mellitus and agranulocytosis are associated with the atypical antipsychotics, including risperidone.

A patient with advanced dementia is bed-bound and requires total assistance with all activities of daily living. She was treated recently for pneumonia, which has raised concerns that she is aspirating. Her oral intake has decreased and is not adequate for the patient's nutritional requirements. She does not have an advance directive. You schedule a family conference. Which one of the following is your recommended approach to this problem?

A. Clear liquids
B. Intravenous fluids
C. Hand feeding
D. Percutaneous endoscopic gastrostomy (PEG) tube feeding
E. Nasogastric tube feeding

ANSWER: C

Which one of the following activities is most likely to be impaired in early dementia?

A. Dressing
B. Eating
C. Toileting
D. Grooming
E. Cooking

ANSWER: E

An elderly male with mild dementia is involved in a motor vehicle accident, and his son is concerned that it may no longer be safe for him to drive. Which one of the following has the legal authority to revoke or restrict this patient's driver's license?

A. The patient's son
B. A psychiatric consultant
C. The person designated as having power of attorney
D. The family physician
E. A representative of the state department of motor vehicles

ANSWER: E

Mild cognitive impairment is characterized by which one of the following?

A. Localized motor dysfunction
B. Impairment in at least one activity of daily living
C. Impairment in at least one instrumental activity of daily living

D. The presence of the APO E4 allele
E. Objective evidence of memory decline

ANSWER: E

Which one of the following medications is associated with a higher risk of death due to stroke or sudden cardiac death in patients with dementia?

A. Diazepam (Valium)
B. Fluoxetine (Prozac)
C. Paroxetine (Paxil)
D. Quetiapine (Seroquel)
E. Venlafaxine

ANSWER: D

A 79-year-old female had a total knee replacement yesterday. She has mild dementia as a result of a stroke 10 years ago, but her dementia has been stable since then. Last night she became confused and agitated, striking out at nurses and could not be consoled. Which one of the following would be most appropriate at this time?

A. Soft restraints
B. CT of the head
C. Adequate pain control
D. A sedating SSRI such as paroxetine (Paxil)
E. Lorazepam (Ativan) intravenously as needed

ANSWER: C

A 90-year-old female with severe dementia is seen in the emergency department for a left knee strain. She was at home alone for 2 hours and no fall or injury was witnessed. A radiograph of the knee is negative, and she is referred to you for follow-up the next day. At the follow-up visit the patient is confused and agitated, and cries out at any attempt to examine her. She is unable to bear weight on her left leg and it appears to be externally rotated. Which one of the following would be most appropriate at this point?

A. Reassurance and pain medication
B. A repeat radiograph of the left knee
C. A radiograph of the left hip
D. A radiograph of the lumbosacral spine
E. MRI of the left knee

ANSWER: C

A previously alert, otherwise healthy 74-year-old African-American male has a history of slowly developing progressive memory loss and dementia associated with urinary incontinence and gait disturbance resembling ataxia. This presentation is most consistent with?

A. normal pressure hydrocephalus
B. Alzheimer's disease
C. subacute sclerosing panencephalitis
D. multiple sclerosis

ANSWER: A

In normal pressure hydrocephalus a mild impairment of memory typically develops gradually over weeks or months, accompanied by mental and physical slowness. The condition progresses insidiously to severe dementia. Patients also develop an unsteady gait and urinary incontinence, but there are no signs of increased intracranial pressure.

Alzheimer:

An 80-year-old male sees you for the first time. He is asymptomatic except for some fatigue. His pulse rate is 50 beats/min. An EKG shows a prolonged PR interval. Which one of the following medications in his current regimen is the most likely explanation for these findings?

A. Donepezil (Aricept)
B. Escitalopram (Lexapro)
C. Lisinopril (Prinivil, Zestril)
D. Memantine (Namenda)
E. Zolpidem (Ambien)

ANSWER: A

Should be avoided in patients with syncope, due to an increased risk of bradycardia.

A 78-year-old white male presents to your office with his daughter for a follow-up visit for his diabetes. He has a history of peripheral neuropathy and mild Alzheimer's dementia. He continues to be socially active in his community. He is on several medications, including insulin glargine (Lantus), amitriptyline, donepezil (Aricept), and clonazepam (Klonopin). His daughter asks whether he should continue to drive his car. Which one of the following would be most appropriate in the context of this office visit with regard to evaluating his driving safety?

A. A thorough history focused on the patient's driving, from both him and his daughter

B. A written driving test
C. A road test to observe his driving
D. A letter to the local agency in charge of drivers' licenses advising license removal

ANSWER: A

A long-term care resident is admitted to the hospital. The patient has a living will which specifies that "Treatment be withheld or withdrawn and that I be permitted to die naturally with only the administration of medication or the performance of any medical treatment deemed necessary to alleviate pain." The patient has appointed his wife as his health care surrogate. He has mild Alzheimer's disease and scored 26 out of 30 on a Mini-Mental State Examination performed within the last month. He is alert and pleasant and responds appropriately to questions but cannot remember the current date. His wife is with him. Which one of the following would be most appropriate with regard to decision making and ordering related to the patient's code status?

A. Determine the patient's competence
B. Assess the patient's decision-making capacity
C. Confirm the code status with the patient's wife
D. Write a Do Not Resuscitate (DNR) order
E. Order comfort measures only

ANSWER: B

You are caring for an 88-year-old female nursing-home resident with multiple comorbidities and advanced Alzheimer's disease. The patient has never completed advance directives and no longer has the ability to make decisions. The family inquiries about hospice services for this patient. Which one of the following is true regarding this patient and hospice?

A. Nursing-home residents are not eligible for hospice
B. The decision to enter hospice care is reversible
C. End-stage Alzheimer's disease is not a qualifying diagnosis for hospice
D. Failure to complete advance directives by this patient prevents participation in hospice
E. The patient must have a life expectancy of less than 4 months to qualify for hospice services

ANSWER: B
The patient must be certified by the hospice medical director and primary physician to have a life expectancy of less than 6 months to qualify for hospice services.

Which one of the following features in an elderly patient with cognitive problems is more suggestive of depression than of Alzheimer's disease?

A. A long duration of cognitive problems
B. A slow progression of cognitive problems
C. Delusions that are congruent with mood
D. No past history of psychiatric problems

ANSWER: C

A longer duration of cognitive problems, slow progression of cognitive problems, and no past history of psychiatric problems are more typical of dementia.

An 85-year-old male is brought to your office by his family for a follow-up visit for Alzheimer's dementia. His dementia has been present for 4 years. He has been experiencing increasing agitation and delusions over the past several weeks, and the family requests a medication to "calm him down." Which one of the following is indicated in this situation according to FDA guidelines?

A. Aripiprazole (Abilify)
B. Haloperidol
C. Olanzapine (Zyprexa)
D. Risperidone (Risperdal)
E. No antipsychotic drugs

ANSWER: E

The FDA states that antipsychotics are not indicated for treating dementia-related psychosis.

Delirium:

An 80-year-old male is admitted to the hospital for pneumonia. He develops what the nurses describe to you as "sundowning" behavior that includes nighttime disorientation and some mild agitation. His wife says he is not like this at home. During morning rounds he is pleasant and answers questions appropriately except he forgets why he is in the hospital. His examination, including a neurologic examination, is normal except for crackles on chest auscultation consistent with the pneumonia. He is not able to say the days of the week backwards. Which one of the following is most likely in this patient?

A. Alzheimer's disease
B. Delirium
C. Vascular dementia
D. Encephalitis
E. Stroke

ANSWER: B

A patient who has terminal metastatic lung cancer with bony metastases is being cared for at home and using hospice services. The hospice nurse calls you during the night because the family had called her to come to the house. When she arrived, she found the patient acutely agitated, confused, and disoriented, and he does not recognize his family members. The patient is trying to hit his caretakers, who are distressed by the situation. In addition to checking for underlying causes of these acute symptoms, which one of the following is most appropriate for managing this problem?

A. Amitriptyline
B. Haloperidol
C. Scopolamine
D. Trazodone (Oleptro)

ANSWER: B
This patient is experiencing delirium, which is common in the last weeks of life, occurring in 26%–44% of persons hospitalized with advanced cancer and in up to 88% of persons with a terminal illness. Antipsychotic agents such as haloperidol are effective for the management of delirium, and they are widely used.

An 85-year-old male admitted to the hospital for shortness of breath is diagnosed with terminal lung cancer. He decides he would like to receive home hospice care. Over the course of his hospitalization he becomes increasingly confused and forgets where he is and why he is there. He appears depressed with a flat affect. He repeatedly tries to get out of bed and pulls at his IV line and catheter. Which one of the following medications would be most appropriate for treating these symptoms?

A. Haloperidol
B. Nortriptyline (Pamelor)
C. Pentobarbital (Nembutal)
D. Lorazepam (Ativan)
E. Mirtazapine (Remeron)

ANSWER: A
Antipsychotic medications are the drug of choice to improve delirium. Central nervous system depressants such as benzodiazepines and barbiturates should be avoided because they can make delirium worse. Nortriptyline has anticholinergic side effects and can also cause delirium. Mirtazapine would not be helpful for treating delirium.

In the hospital setting, the use of atypical antipsychotics is most appropriate for which one of the following conditions?

A. Hospital-associated insomnia
B. ICU-associated delirium

C. Resistance to care in a patient with dementia
D. Aggression in a patient with dementia

ANSWER: B

An 85-year-old female is admitted to the hospital for surgery and develops confusion postoperatively. The patient is a widow and lived independently prior to admission. Her daughter says the confusion is atypical for her mother. She does not have a history of memory loss, forgetfulness, or confusion prior to admission. Which one of the following cognitive assessment tests should be used to assess her acute change in mental status?

A. Confusion Assessment Method (CAM)
B. Mini-Cog
C. Mini-Mental State Examination (MMSE)
D. Montreal Cognitive Assessment test (MoCA)
E. Saint Louis University Mental Status exam (SLUMS)

ANSWER: A

A 77-year-old female with widely metastatic lung cancer is seen in her home with increased confusion, hallucinations, and combative behavior for the past 2 days. She has not slept and has a very poor appetite. Which one of the following should be the first step in the management of this patient?

A. Place her in gentle restraints for safety
B. Determine and treat the underlying cause of the behavior change
C. Start diphenhydramine (Benadryl) at bedtime for sleep
D. Start mirtazapine (Remeron) at bedtime for sleep and appetite
E. Start lorazepam (Ativan) as needed for agitation

ANSWER: B

A 65-year-old male presents to your office with tremor, difficulty sleeping, nausea, agitation, and transient visual hallucinations 3 days after he stopped drinking alcohol following a 3-day binge. His wife has noted increasing confusion over the past several hours. Which one of the following medications would be best for treatment of his alcohol withdrawal delirium?

A. Carbamazepine (Tegretol)
B. Haloperidol
C. Lorazepam (Ativan)
D. Phenobarbital

E. Propofol (Diprivan)

ANSWER: C

The diagnosis of delirium is based on?

A. the history and physical findings
B. complete metabolic panel results
C. toxicology screening results
D. EEG findings
E. MRI of the brain

ANSWER: A

Which one of the following occurs with delirium tremens but is not usually seen with less severe forms of alcohol withdrawal?

A. Fever
B. Hypertension
C. Tachycardia
D. Seizure
E. Visual hallucinations

ANSWER: A

An 88-year-old male has been hospitalized for the past 3 days after being found on the floor of his home by a neighbor and transported to the hospital by ambulance. He was cachectic and dehydrated at the time of admission, with a serum albumin level of 1.9 g/dL (N 3.5–4.7). He has received intravenous fluids and is now euvolemic. He began nasogastric tube feeding 2 days ago and has now developed nausea, vomiting, hypotension and delirium. Which one of the following is the most classic electrolyte abnormality with this condition?

A. Hypocalcemia
B. Hypercalcemia
C. Hyperkalemia
D. Hypophosphatemia
E. Hyperphosphatemia

ANSWER: D

Refeeding syndrome can be defined as the potentially fatal shifts in fluids and electrolytes that may occur in malnourished patients receiving artificial refeeding (whether enterally or parenterally).

A previously healthy 73-year-old male is admitted to the intensive-care unit after an emergency appendectomy. He does well until the evening when he suddenly appears confused. His speech is rambling and incoherent, and he is disoriented to person, place, and time. His wife says he was sleepy but otherwise acting normal 2 hours ago. On examination he has normal vital signs and no fever. Other than the cognitive changes and some mild peri-incisional tenderness the examination is normal. Serum electrolytes, a CBC, arterial blood gases, and a routine chemistry panel are normal. The most likely cause for his altered sensorium is:

A. sepsis
B. acute psychosis
C. dementia with Lewy bodies
D. delirium
E. ischemic stroke

ANSWER: D

The syndrome of delirium is common in the postoperative setting. It is characterized by disorganized thinking. rambling, incoherent speech; and a reduced ability to maintain and shift attention. This syndrome typically begins abruptly and may fluctuate hourly.

Falls, Elder Abuse:

The Timed Up and Go test is used to evaluate geriatric patients for which one of the following?

A. Risk of falling
B. Effects of peripheral neuropathy
C. Kinetic tremor
D. Neurocardiogenic syncope
E. Central causes of vertigo

ANSWER: A

The Timed Up and Go test is the most frequently recommended screening test for mobility. It takes less than a minute to perform and involves asking the patient to rise from a chair, walk 10 feet, turn, return to the chair, and sit down. Any unsafe or ineffective movement with this test suggests balance or gait impairment and an increased risk of falling. If the test is abnormal, referral to physical therapy for complete evaluation and assessment should be considered. Other interventions should also be considered, such as a medication review for factors related to the risk of falling.

The Timed Up and Go test consists of a patient rising from a chair, walking 3 meters (or about 10 feet), turning around, walking back, and sitting back down. The average healthy adult over the age of 60 can perform this in how many seconds.

A. 5
B. 10
C. 20
D. 30
E. 45

ANSWER: B

For the average adult over the age of 60, the normal time required for the Timed Up and Go test is 10 seconds. A time longer than 10 seconds may indicate weakness, a balance or gait problem, and/or an increased fall risk.

An 84-year-old male is walking across the street and has to hurry to avoid oncoming traffic. He suddenly develops extreme pain in his knee and falls down and has to be carried to the sidewalk. The following day he comes to the emergency department. He is comfortable when placed in a knee immobilizer, but is very tender just above the patella. He can bend his knee but when he tries to straighten his leg it is so weak that he cannot move it at all. Radiographs of the knee are shown below. What is the most likely diagnosis?

A. Patellar tendon rupture
B. Quadriceps tendon rupture
C. Tibial plateau fracture
D. Patellar subluxation
E. Lumbar radiculopathy

ANSWER: B

A disheveled 89-year-old male with dementia who relies on a caregiver for bathing, dressing, shopping, and meal preparation is brought in for continued evaluation of weight loss. No medical cause has been found at this point. On examination a large purplish bruise is noted over his posterior leg and a more faded greenish yellow bruise is noted over his abdomen, which his caregiver explains by saying that he has fallen several times recently. The patient is also noted to have a large sacral decubitus ulcer. Which one of the following should you suspect as the cause of bruising in this patient?

A. Senile purpura
B. Thrombocytopenia
C. Leukemia
D. Elder abuse
E. Cushing syndrome

ANSWER: D

This patient has numerous red flags for elder abuse, including unexplained weight loss, reliance on a caregiver, a disheveled appearance, a pressure ulcer, and bruising in locations that are not typically associated with unintentional trauma from falls.

The leading type of injury in adults aged 65 and older is?

A. automobile accidents
B. falls
C. gunshot wounds
D. fire-related injuries
E. hypothermia

ANSWER: B

A 70-year-old white female asks you to evaluate her right shoulder because of pain and limited range of motion. Further history reveals that 2 months ago she slipped in her kitchen and caught onto the refrigerator door handle to avoid falling to the floor. On examination she has pain and weakness at 45° of abduction and weakness on external rotation. She should be treated for

A. bicipital tendinitis
B. disruption of the glenoid fossa
C. rotator cuff tear
D. acromioclavicular separation
E. incomplete fracture of the humeral head

ANSWER: C

You are the attending physician at a long-term care facility. A new resident, an 85-year-old female, presents for an initial evaluation. Upon reviewing her history, you find that she is on 18 different medications. Until you can obtain additional history and medical records, you decide to stop or decrease some of her medications and monitor her response. Which one of the following would be most appropriate to stop or decrease initially?

A. Sertraline (Zoloft), 25 mg daily
B. Acetaminophen/diphenhydramine (Tylenol PM), 500 mg/25 mg daily
C. Dipyridamole/aspirin (Aggrenox), 200 mg/25 mg daily
D. Digoxin, 0.125 mg every other day
E. Omeprazole (Prilosec), 20 mg daily

ANSWER: B

The anticholinergic properties of older antihistamines produce effects such as dry mouth, constipation, blurred vision, and drowsiness. The sedative effect of older antihistamines also increases the risk of falls. Hip fracture and subsequent death have been reported in patients who use older antihistamines such as diphenhydramine. Sertraline is an SSRI, a preferred class for the treatment of depression in the elderly compared to the tricyclic antidepressants, which are associated with several side effects. Dipyridamole is associated with hypotension in elderly patients, but it benefits some individuals by preventing strokes. It can be used in the elderly, but patients should be monitored for side effects. Therefore, until further information is obtained, it is appropriate to continue the dipyridamole/aspirin in this patient. When used in elderly patients with heart failure, digoxin should be given in a dosage no greater than 0.125 mg daily; the low dosage used in this individual should not be considered inappropriate until the reason for its use is clarified. While omeprazole can cause problems in the elderly with long-term use, 20 mg/day is a relatively low dose and the decision to discontinue its use should be delayed until more history is available.

Which one of the following effects of vitamin D is supported by the best evidence?

A. It prevents cardiovascular disease
B. It prevents colon cancer
C. It prevents dementia
D. It reduces falls in community-dwelling older adults

ANSWER: D

You suspect orthostatic hypotension in an elderly male who reports “dizziness” when standing up, and you decide to obtain recumbent and standing blood pressure measurements. After the patient rests in a supine position for 5 minutes, you measure his baseline blood pressure and then ask him to stand, which he does without a problem. For how long his blood pressure should be periodically measured before considering the test complete?

A. 30 seconds
B. 60 seconds
C. 90 seconds
D. 3 minutes
E. 5 minutes

ANSWER: D

Orthostatic hypotension is defined as a documented drop in blood pressure of at least 20 mm Hg systolic or 10 mm Hg diastolic that occurs within 3 minutes of standing.

Staff members of an assisted-living facility ask for your advice regarding aerobic exercise programs for them older residents. The evidence is greatest for which one of the following benefits of physical activity in the elderly?

A. Maintaining weight after weight loss
B. Improving quality of sleep
C. Increasing bone density
D. Reducing the risk of falls

ANSWER: D

A previously healthy 82-year-old male is brought to your office by his daughter after a recent fall while getting up to go to the bathroom in the middle of the night. The patient denies any history of dizziness, chest pain, palpitations, or current injury. He has a history of bilateral dense cataracts. On examination, he is found to have an increased stance width and walks carefully and cautiously with his arms and legs abducted. A timed up-and-go test is performed, wherein the patient is asked to rise from a chair without using his arms, walk 3 meters, turn, return to his chair, and sit down. It takes the patient 25 seconds, and he is noted to have an "en bloc" turn. Which one of the following is the most likely cause of this patient's gait and balance disorder?

A. Visual impairment
B. Cerebellar degeneration
C. Frontal lobe degeneration
D. Parkinson's disease
E. Motor neuropathy

ANSWER: A

Gait and balance disorders are one of the most common causes of falls in older adults. This patient has the cautious gait associated with visual impairment.

A neurologically intact 77-year-old female presents with severe low back pain following a fall 2 days ago that caused her to land on her buttocks. A radiograph of her lower spine shows a compression fracture of L3 with a loss of about 50% of the vertebral body height. Which one of the following is most appropriate at this point?

A. Referral for kyphoplasty
B. Referral for vertebroplasty
C. Back bracing
D. Bed rest
E. Calcitonin-salmon (Miacalcin)

ANSWER: E

Calcitonin has been shown to reduce the incidence of recurrent fractures and may be useful in the relief of pain.

Which one of the following is recommended with regard to the use of osteoporosis medications in elderly patients?

A. Substitution of denosumab (Prolia) for bisphosphonates in patients planning extensive dental work
B. Use of denosumab in patients at increased risk for infection
C. Use of denosumab rather than bisphosphonates in patients with class III or IV renal dysfunction
D. Continuous use of bisphosphonates for 10 years or more

ANSWER: C

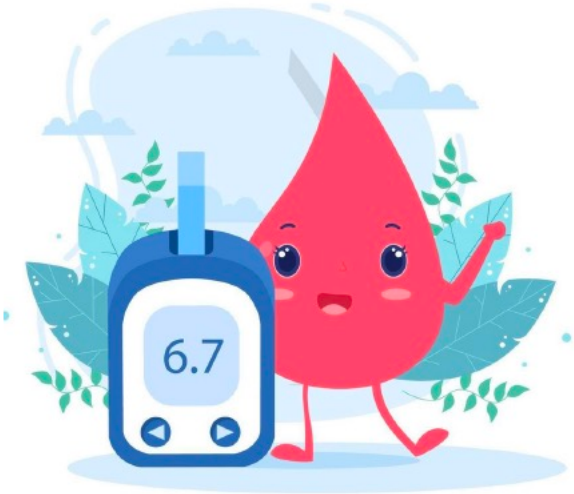
The use of medications for osteoporosis is associated with various side effects, some of which have only recently been recognized. Denosumab and bisphosphonates have similar, albeit low, risks for jaw osteonecrosis. Bisphosphonates should not be used in patients with a creatinine clearance <35 mL/min/1.73 m2, but denosumab is not cleared by the kidneys and is safe in patients with chronic kidney disease. The use of bisphosphonates for more than 5 years can increase the risk of atypical fractures and a holiday from the drug is recommended after either 3 or 5 years, depending on the drug used.

A 72-year-old female presents with a 2-month history of constipation. She says she has to strain to evacuate at least half the time and reports that her stools have become clay-like in consistency and narrower in caliber. At least half the time she has the sensation that evacuation is not complete, and she has occasionally used manual maneuvers to complete evacuation. She had a normal colonoscopy 8 years ago. An abdominal examination is normal, and stool with a clay-like consistency is palpated during a rectal examination. No prolapse is seen with straining, and the anal wink is present. Screening laboratory tests indicate a mild microcytic, hypochromic anemia. Which one of the following would be most appropriate at this time?

A. A trial of lactulose
B. Lifestyle modifications
C. Phosphosoda enemas
D. Colonoscopy
E. Pelvic floor muscle exercises

ANSWER: D

This patient has several red flags that require complete colon evaluation with endoscopy: age >50, a change in stool caliber, and obstructive symptoms. Other red flags include heme-positive stools, anemia consistent with iron deficiency, and rectal bleeding. Malignancy should be eliminated as a possible diagnosis prior to initiating any treatment.



Diabetes Mellitus

Collected by: Abdulrahman Bamhair R1
Reviewed and final revision by: Fai Alrowais R3
Edited by : Nuha Aalmasoud R3

Diabetes Mellitus

Screening

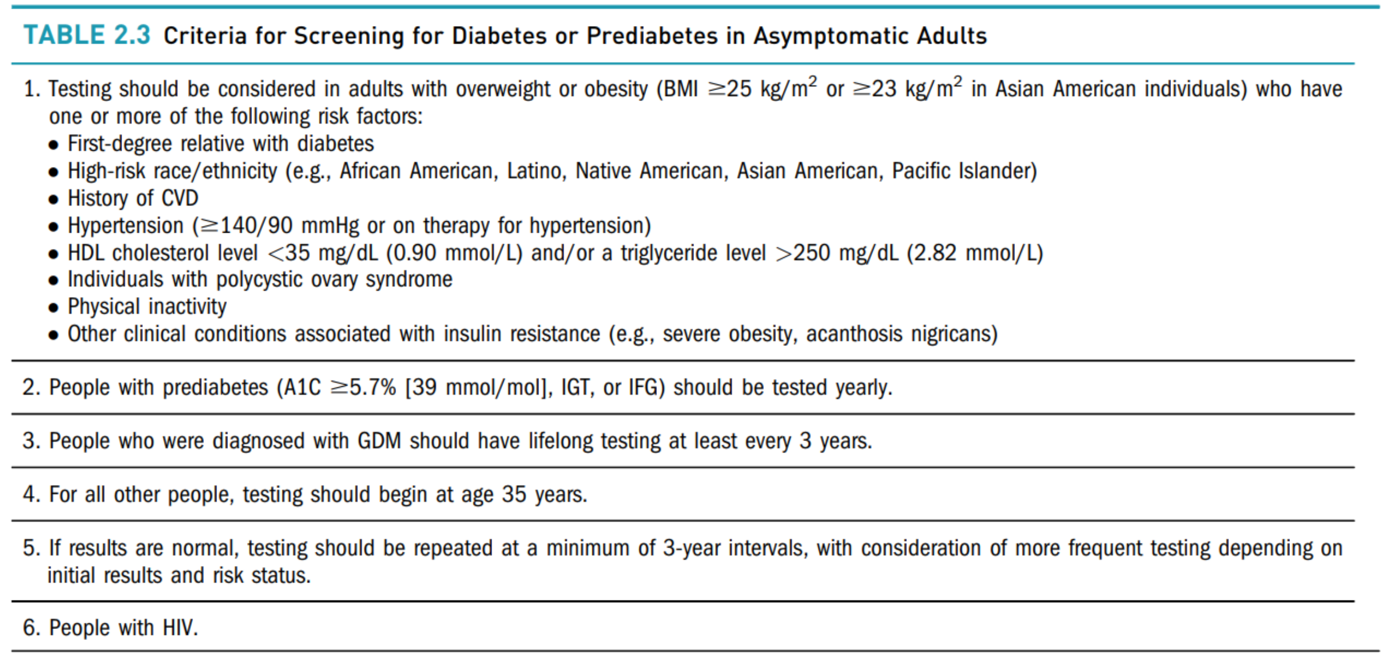


TABLE 2.3 Criteria for Screening for Diabetes or Prediabetes in Asymptomatic Adults

1. Testing should be considered in adults with overweight or obesity (BMI ≥25 kg/m^2 or ≥23 kg/m^2 in Asian American individuals) who have one or more of the following risk factors:
   - First-degree relative with diabetes
   - High-risk race/ethnicity (e.g., African American, Latino, Native American, Asian American, Pacific Islander)
   - History of CVD
   - Hypertension (≥140/90 mmHg or on therapy for hypertension)
   - HDL cholesterol level <35 mg/dL (0.90 mmol/L) and/or a triglyceride level >250 mg/dL (2.82 mmol/L)
   - Individuals with polycystic ovary syndrome
   - Physical inactivity
   - Other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)
2. People with prediabetes (A1C ≥5.7% [39 mmol/mol], IGT, or IFG) should be tested yearly.
3. People who were diagnosed with GDM should have lifelong testing at least every 3 years.
4. For all other people, testing should begin at age 35 years.
5. If results are normal, testing should be repeated at a minimum of 3-year intervals, with consideration of more frequent testing depending on initial results and risk status.
6. People with HIV.

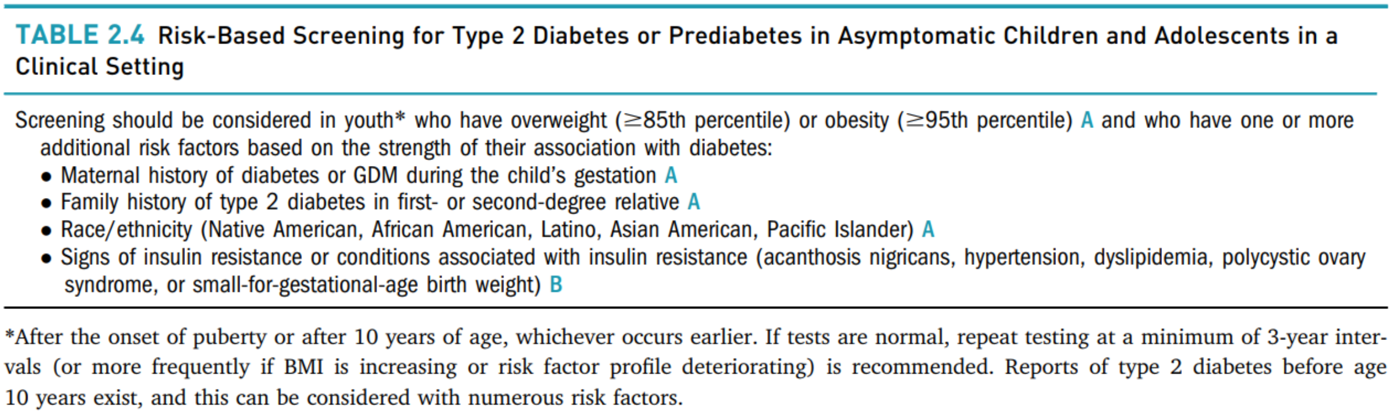


TABLE 2.4 Risk-Based Screening for Type 2 Diabetes or Prediabetes in Asymptomatic Children and Adolescents in a Clinical Setting

Screening should be considered in youth* who have overweight (≥85th percentile) or obesity (≥95th percentile) A and who have one or more additional risk factors based on the strength of their association with diabetes:
- Maternal history of diabetes or GDM during the child's gestation A
- Family history of type 2 diabetes in first- or second-degree relative A
- Race/ethnicity (Native American, African American, Latino, Asian American, Pacific Islander) A
- Signs of insulin resistance or conditions associated with insulin resistance (acanthosis nigricans, hypertension, dyslipidemia, polycystic ovary syndrome, or small-for-gestational-age birth weight) B

*After the onset of puberty or after 10 years of age, whichever occurs earlier. If tests are normal, repeat testing at a minimum of 3-year intervals (or more frequently if BMI is increasing or risk factor profile deteriorating) is recommended. Reports of type 2 diabetes before age 10 years exist, and this can be considered with numerous risk factors.

Diagnosis

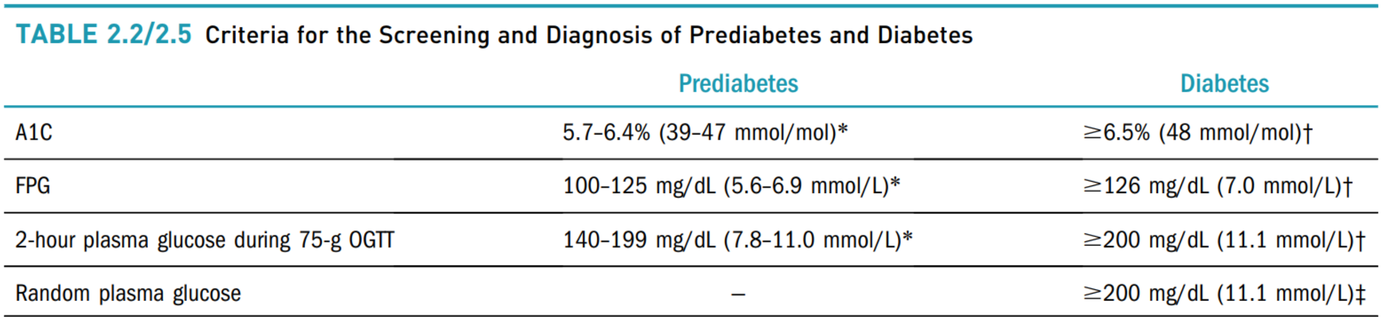
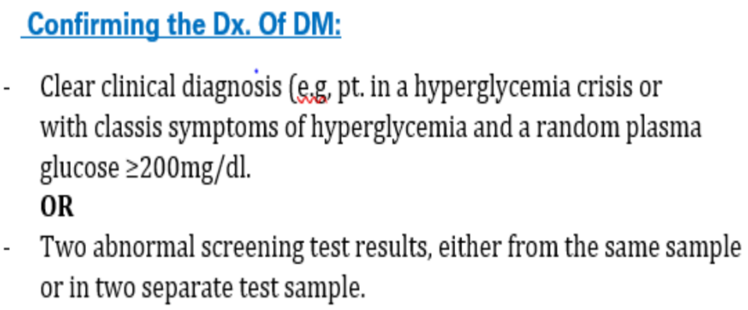


TABLE 2.2/2.5 Criteria for the Screening and Diagnosis of Prediabetes and Diabetes

	Prediabetes	Diabetes
A1C	5.7–6.4% (39–47 mmol/mol)*	≥6.5% (48 mmol/mol)†
FPG	100–125 mg/dL (5.6–6.9 mmol/L)*	≥126 mg/dL (7.0 mmol/L)†
2-hour plasma glucose during 75-g OGTT	140–199 mg/dL (7.8–11.0 mmol/L)*	≥200 mg/dL (11.1 mmol/L)†
Random plasma glucose	–	≥200 mg/dL (11.1 mmol/L)‡



Confirming the Dx. Of DM:

- Clear clinical diagnosis (e.g, pt. in a hyperglycemia crisis or with classis symptoms of hyperglycemia and a random plasma glucose ≥200mg/dl.

  OR
- Two abnormal screening test results, either from the same sample or in two separate test sample.

RECOMMENDATIONS FOR METFORMIN USE IN PREDIABETES:

- Age between 29-59 years with BMI ≥ 35.
- Fasting glucose level ≥ 110 mg/dl
- HbA1c: ≥ 6
- Prior history of gestational diabetes.

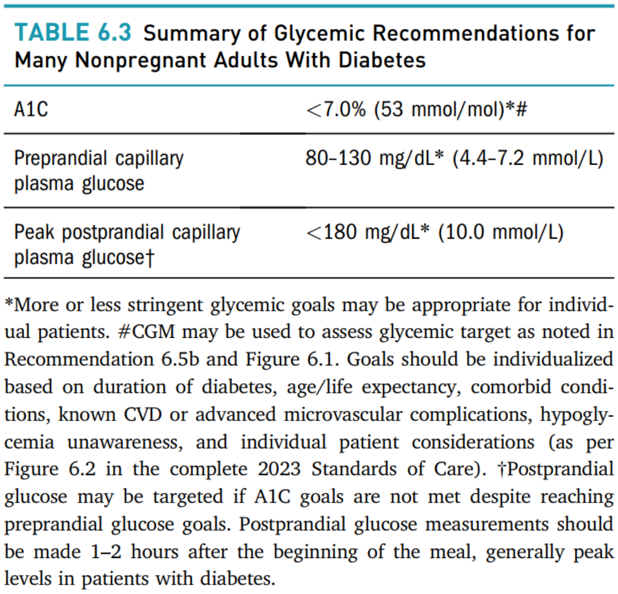


TABLE 6.3 Summary of Glycemic Recommendations for Many Nonpregnant Adults With Diabetes

A1C	<7.0% (53 mmol/mol)*#
Preprandial capillary plasma glucose	80–130 mg/dL* (4.4–7.2 mmol/L)
Peak postprandial capillary plasma glucose†	<180 mg/dL* (10.0 mmol/L)

*More or less stringent glycemic goals may be appropriate for individual patients. #CGM may be used to assess glycemic target as noted in Recommendation 6.5b and Figure 6.1. Goals should be individualized based on duration of diabetes, age/life expectancy, comorbid conditions, known CVD or advanced microvascular complications, hypoglycemia unawareness, and individual patient considerations (as per Figure 6.2 in the complete 2023 Standards of Care). †Postprandial glucose may be targeted if A1C goals are not met despite reaching preprandial glucose goals. Postprandial glucose measurements should be made 1–2 hours after the beginning of the meal, generally peak levels in patients with diabetes.

Glycemic Target:

- An A1C goal for many nonpregnant adults of <7% (53 mmol/mol) without significant hypoglycemia is appropriate.
- Less stringent A1C goals (such as <8% [64 mmol/mol]) may be appropriate for patients with limited life expectancy or where the harms of treatment are greater than the benefits

Management:

Non-pharma:

Diet: 500–750 kcal/day energy deficit. There is no clear evidence that dietary supplements are effective for weight loss.

Physical activity: (5- 7% loss of initial body weight).

- **Adults:** 150 min/week, divided on at least 3 days/week, no more than 2 consecutive days without activity.
2–3 sessions/week of them>> resistance exercise on nonconsecutive days,
(5 times a week, each 30min, 2 of them resistance exercise).
- Shorter durations (minimum 75 minutes/week) of vigorous-intensity or interval training may be sufficient for younger and more physically fit individuals.
- **Children and adolescents**: 60min/day or more of moderate- or vigorous- intensity aerobic activity, with vigorous muscle strengthening and bone-strengthening activities at least 3 days/week.
- **Older adults:** Flexibility training and balance training are recommended 2–3 times/week.

Special Considerations:

- For individuals with proliferative diabetic retinopathy or severe non-proliferative diabetic retinopathy, vigorous-intensity aerobic or resistance exercise may be contraindicated because of the risk of triggering vitreous hemorrhage or retinal detachment.
- Individuals with peripheral neuropathy are at an increased risk of skin breakdown, infection, and Charcot joint destruction with some forms of exercise, due to decreased pain sensation. They should wear proper footwear and examine their feet daily to detect lesions early. Anyone with a foot injury or open sore should be restricted to non–weight-bearing activities.
- Diabetes is associated with autonomic neuropathy, which can increase the risk of exercise-induced injury or adverse events through decreased cardiac responsiveness to exercise, postural hypotension impaire ther more gulation, and greater susceptibility to hypoglycemia.

Liver disease: Patients with type 2 diabetes or prediabetes and elevated liver enzymes or fatty liver on ultrasound should be evaluated for presence of nonalcoholic steatohepatitis and liver fibrosis.

Smoking Cessation counselling.

Diabetes distress: Routinely monitor people with diabetes for diabetes distress, particularly when treatment targets are not met and/or at the onset of diabetes complications.

Pharmacotherapy for obesity:

-Weight loss medications are effective as adjuncts to diet, physical activity, and behavioral counseling for selected people with type 2 diabetes and BMI ≥27 kg/m2. Potential benefits and risks must be considered.

-If a patient's response to weight loss medication is effective (typically defined as >5% weight loss after 3 months' use), further weight loss is likely with continued use.

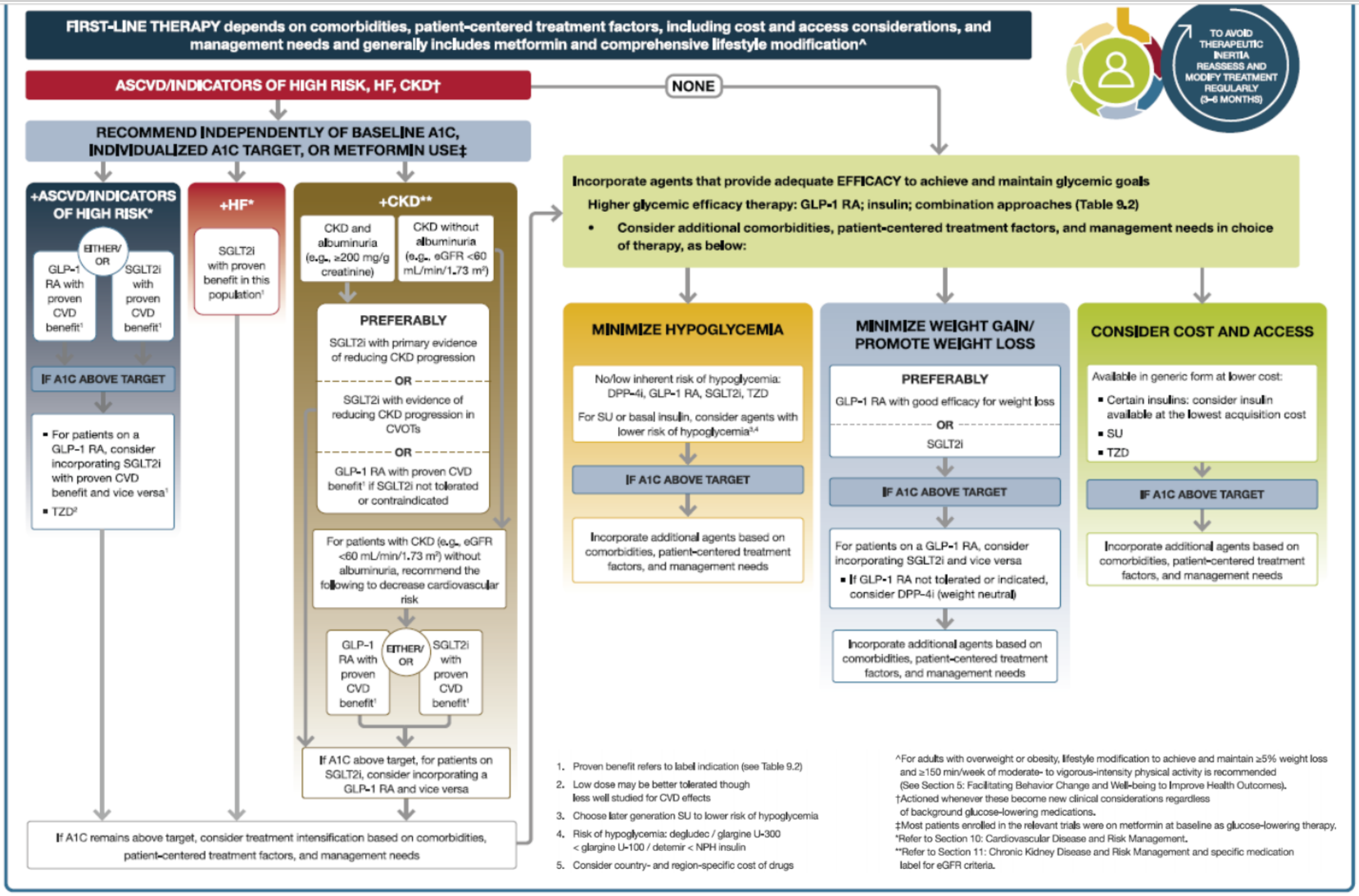
-When early response is insufficient (typically <5% weight loss after 3 months' use) or if there are significant safety or tolerability issues, consider discontinuation of the medication and evaluate alternative medications or treatment approaches.

Metabolic surgery:

Metabolic surgery should be a recommended option to treat type 2 diabetes in screened surgical candidates with BMI ≥40 kg/m2 (BMI $37.5 kg/m2 in Asian Americans) and in adults with BMI 35.0–39.9 kg/m2 (32.5–37.4 kg/m2 in Asian Americans) who do not achieve durable weight loss and improvement in comorbidities (including hyperglycemia) with nonsurgical methods.

PHARMACOLOGIC APPROACHES TO GLYCEMIC TREATMENT in T2DM:

- (Glucagon-like peptide 1 [GLP-1] receptor agonists, sodium–glucose cotransporter 2 [SGLT2] inhibitors), with or without metformin based on glycemic needs, are appropriate initial therapy for individuals with type 2 diabetes with or at high risk for (ASCVD), HF, and/or chronic kidney disease (CKD)
- Metformin should be continued upon initiation of insulin therapy (unless contraindicated or not tolerated) for ongoing glycemic and metabolic benefits.
- Early combination therapy can be considered in some patients at treatment initiation to extend the time to treatment failure.
- **The early introduction of insulin:** should be considered if there is evidence of ongoing catabolism (weight loss), if symptoms of hyperglycemia are present, or when A1C levels (>10% [86 mmol/ mol]) or blood glucose levels ($300 mg/dL [16.7 mmol/L]) are very high.
- In patients with type 2 diabetes, a GLP-1 receptor agonist is preferred to insulin when possible.
- If insulin is used, combination therapy with a GLP-1 receptor agonist is recommended for greater efficacy and durability of treatment effect.
- Clinical signals that may prompt evaluation of **overbasalization** include basal dose greater than _0.5 units/kg, high bedtime-morning or post-preprandial glucose differential (e.g., bedtime-morning glucose differential ≥50 mg/dL), hypoglycemia (aware or unaware), and high variability.
- Glycemic status should be assessed, with treatment modified regularly (e.g., at least twice yearly if stable and more often if not at goal) to achieve treatment goal.



FIRST-LINE THERAPY depends on comorbidities, patient-centered treatment factors, including cost and access considerations, and management needs and generally includes metformin and comprehensive lifestyle modification^

ASCVD/INDICATORS OF HIGH RISK, HF, CKD†

NONE

TO AVOID THERAPEUTIC INERTIA REASSESS AND MODIFY TREATMENT REGULARLY (3–6 MONTHS)

RECOMMEND INDEPENDENTLY OF BASELINE A1C, INDIVIDUALIZED A1C TARGET, OR METFORMIN USE‡

+ASCVD/INDICATORS OF HIGH RISK*

GLP-1 RA with proven CVD benefit[1]

EITHER/ OR

SGLT2i with proven CVD benefit[1]

IF A1C ABOVE TARGET

- For patients on a GLP-1 RA, consider incorporating SGLT2i with proven CVD benefit and vice versa[1]
- TZD[2]

+HF*

SGLT2i with proven benefit in this population[1]

+CKD**

CKD and albuminuria (e.g., ≥200 mg/g creatinine)

CKD without albuminuria (e.g., eGFR <60 mL/min/1.73 m²)

PREFERABLY

SGLT2i with primary evidence of reducing CKD progression

OR

SGLT2i with evidence of reducing CKD progression in CVOTs

OR

GLP-1 RA with proven CVD benefit[1] if SGLT2i not tolerated or contraindicated

For patients with CKD (e.g., eGFR <60 mL/min/1.73 m²) without albuminuria, recommend the following to decrease cardiovascular risk

GLP-1 RA with proven CVD benefit[1]

EITHER/ OR

SGLT2i with proven CVD benefit[1]

If A1C above target, for patients on SGLT2i, consider incorporating a GLP-1 RA and vice versa

If A1C remains above target, consider treatment intensification based on comorbidities, patient-centered treatment factors, and management needs

Incorporate agents that provide adequate EFFICACY to achieve and maintain glycemic goals

Higher glycemic efficacy therapy: GLP-1 RA; insulin; combination approaches (Table 9.2)

- **Consider additional comorbidities, patient-centered treatment factors, and management needs in choice of therapy, as below:**

MINIMIZE HYPOGLYCEMIA

No/low inherent risk of hypoglycemia: DPP-4i, GLP-1 RA, SGLT2i, TZD

For SU or basal insulin, consider agents with lower risk of hypoglycemia[3,4]

IF A1C ABOVE TARGET

Incorporate additional agents based on comorbidities, patient-centered treatment factors, and management needs

MINIMIZE WEIGHT GAIN/ PROMOTE WEIGHT LOSS

PREFERABLY

GLP-1 RA with good efficacy for weight loss

OR

SGLT2i

IF A1C ABOVE TARGET

For patients on a GLP-1 RA, consider incorporating SGLT2i and vice versa

- If GLP-1 RA not tolerated or indicated, consider DPP-4i (weight neutral)

Incorporate additional agents based on comorbidities, patient-centered treatment factors, and management needs

CONSIDER COST AND ACCESS

Available in generic form at lower cost:

- Certain insulins: consider insulin available at the lowest acquisition cost
- SU
- TZD

IF A1C ABOVE TARGET

Incorporate additional agents based on comorbidities, patient-centered treatment factors, and management needs

1. Proven benefit refers to label indication (see Table 9.2)
2. Low dose may be better tolerated though less well studied for CVD effects
3. Choose later generation SU to lower risk of hypoglycemia
4. Risk of hypoglycemia: degludec / glargine U-300 < glargine U-100 / detemir < NPH insulin
5. Consider country- and region-specific cost of drugs

^For adults with overweight or obesity, lifestyle modification to achieve and maintain ≥5% weight loss and ≥150 min/week of moderate- to vigorous-intensity physical activity is recommended (See Section 5: Facilitating Behavior Change and Well-being to Improve Health Outcomes).

†Actioned whenever these become new clinical considerations regardless of background glucose-lowering medications.

‡Most patients enrolled in the relevant trials were on metformin at baseline as glucose-lowering therapy.

*Refer to Section 10: Cardiovascular Disease and Risk Management.

**Refer to Section 11: Chronic Kidney Disease and Risk Management and specific medication label for eGFR criteria.

	Efficacy	Hypoglycemia	Weight change	CV effects		Cost	Oral/SQ	Renal effects		Additional considerations
				ASCVD	HF			Progression of DKD	Dosing/use considerations*	
Metformin	High	No	Neutral (potential for modest loss)	Potential benefit	Neutral	Low	Oral	Neutral	▪ Contraindicated with eGFR <30 mL/min/1.73 m²	▪ Gastrointestinal side effects common (diarrhea, nausea) ▪ Potential for B12 deficiency
SGLT2 inhibitors	Intermediate	No	Loss	Benefit: empagliflozin†, canagliflozin†	Benefit: empagliflozin‡, canagliflozin, dapagliflozin‡, ertugliflozin	High	Oral	Benefit: canagliflozin§, empagliflozin, dapagliflozin§	▪ See labels for renal dose considerations of individual agents ▪ Glucose-lowering effect is lower for SGLT2 inhibitors at lower eGFR	▪ Should be discontinued before any scheduled surgery to avoid potential risk for DKA ▪ DKA risk (all agents, rare in T2D) ▪ Risk of bone fractures (canagliflozin) ▪ Genitourinary infections ▪ Risk of volume depletion, hypotension ▪ ↑LDL cholesterol ▪ Risk of Fournier's gangrene
GLP-1 RAs	High	No	Loss	Benefit: dulaglutide†, liraglutide†, semaglutide (SQ)† Neutral: exenatide once weekly, lixisenatide	Neutral	High	SQ; oral (semaglutide)	Benefit on renal end points in CVOTs, driven by albuminuria outcomes: liraglutide, semaglutide (SQ), dulaglutide	▪ See labels for renal dose considerations of individual agents ▪ No dose adjustment for dulaglutide, liraglutide, semaglutide ▪ Caution when initiating or increasing dose due to potential risk of nausea, vomiting, diarrhea, or dehydration. Monitor renal function in patients reporting severe adverse GI reactions when initiating or increasing dose of therapy.	▪ **FDA Black Box:** Risk of thyroid C-cell tumors in rodents; human relevance not determined **(liraglutide, dulaglutide, exenatide extended release, semaglutide)** ▪ GI side effects common (nausea, vomiting, diarrhea) ▪ Injection site reactions ▪ Pancreatitis has been reported in clinical trials but causality has not been established. Discontinue if pancreatitis is suspected.
DPP-4 inhibitors	Intermediate	No	Neutral	Neutral	Potential risk: saxagliptin	High	Oral	Neutral	▪ Renal dose adjustment required (sitagliptin, saxagliptin, alogliptin); can be used in renal impairment ▪ No dose adjustment required for linagliptin	▪ Pancreatitis has been reported in clinical trials but causality has not been established. Discontinue if pancreatitis is suspected. ▪ Joint pain
Thiazolidinediones	High	No	Gain	Potential benefit: pioglitazone	Increased risk	Low	Oral	Neutral	▪ No dose adjustment required ▪ Generally not recommended in renal impairment due to potential for fluid retention	▪ **FDA Black Box:** Congestive heart failure **(pioglitazone, rosiglitazone)** ▪ Fluid retention (edema; heart failure) ▪ Benefit in NASH ▪ Risk of bone fractures ▪ Bladder cancer (pioglitazone) ▪ ↑LDL cholesterol (rosiglitazone)
Sulfonylureas (2nd generation)	High	Yes	Gain	Neutral	Neutral	Low	Oral	Neutral	▪ Glyburide: generally not recommended in chronic kidney disease ▪ Glipizide and glimepiride: initiate conservatively to avoid hypoglycemia	▪ FDA Special Warning on increased risk of cardiovascular mortality based on studies of an older sulfonylurea (tolbutamide)
Insulin **Human insulin**	High	Yes	Gain	Neutral	Neutral	Low (SQ)	SQ; inhaled	Neutral	▪ Lower insulin doses required with a decrease in eGFR; titrate per clinical response	▪ Injection site reactions ▪ Higher risk of hypoglycemia with human insulin (NPH or premixed formulations) vs. analogs
Analogs						High	SQ			

Co-morbidities and complications:

1- CVD:

- ASCVD—defined as coronary heart disease, cerebrovascular disease, or peripheral arterial disease (PAD) presumed to be of atherosclerotic origin—is the leading cause of morbidity and mortality for individuals with diabetes. Controlling individual CV risk factors helps prevent or slow ASCVD in people with diabetes.
- Risk factors including duration of diabetes, obesity/ overweight, hypertension, dyslipidemia, smoking, a family history of premature coronary disease, CKD, and the presence of albuminuria, should be assessed at least annually in all patients with diabetes to prevent and manage both ASCVD and HF.

Screening:

- Routine screening for CAD is not recommended as long as ASCVD risk factors are treated.
- Consider investigations for CAD in the presence of any of the following: atypical cardiac symptoms (e.g., unexplained dyspnea, chest discomfort); signs or symptoms of associated vascular disease, including carotid bruits, transient ischemic attack, stroke, claudication, or PAD; or electrocardiogram abnormalities (e.g., Q waves).

Recommendations:

- For patients with blood pressure >120/80 mmHg, lifestyle intervention consists of weight loss when indicated, (DASH)-style eating pattern, including reducing sodium and increasing potassium intake, moderation of alcohol intake, and increased physical activity.
- For individuals with diabetes and hypertension at higher CV risk (existing ASCVD or 10-year ASCVD risk ≥15%), a blood pressure target of <130/80 mmHg may be appropriate, if it can be safely attained.
- For individuals with diabetes and hypertension at lower risk for CVD (10-year ASCVD risk <15%), treat to a blood pressure target of <140/90 mmHg.
- ACE inhibitors or ARBs are recommended first-line therapy for hypertension in people with diabetes and coronary artery disease (CAD).
- Multiple-drug therapy is generally required to achieve blood pressure targets. However, combinations of ACE inhibitors and ARBs and combinations of ACE inhibitors or ARBs with direct renin inhibitors should not be used.
- Patients with hypertension who are not meeting blood pressure targets on three classes of antihypertensive medications (including a diuretic) should be considered for mineralocorticoid receptor antagonist (MRA) therapy.
- An ACE inhibitor or ARB, at the maximum tolerated dose indicated for blood pressure treatment, is the recommended first-line treatment for hypertension in patients with diabetes and urinary albumin-to-creatinine ratio (UACR) ≥300 mg/g creatinine or 30–299 mg/g creatinine.
- For patients treated with an ACE inhibitor, ARB, or diuretic, serum creatinine/estimated glomerular filtration rate (eGFR) and serum potassium levels should be monitored at least annually.
- For patients of all ages with diabetes and ASCVD, high-intensity statin therapy should be added to lifestyle therapy.
- For patients with diabetes and ASCVD considered very high risk using specific criteria, if LDL cholesterol is ≥70 mg/dL on maximally tolerated statin dose, consider adding additional LDL-lowering therapy (such as ezetimibe or PCSK9 inhibitor).
- For patients who do not tolerate the intended intensity, the maximally tolerated statin dose should be used.
- In adults with diabetes aged >75 years already on statin therapy, it is reasonable to continue statin treatment.
- In adults with diabetes aged >75 years, it may be reasonable to initiate statin therapy after discussion of potential benefits and risks.
- For patients with fasting triglyceride levels ≥500 mg/dL, evaluate for secondary causes of hypertriglyceridemia and consider medical therapy to reduce the risk of pancreatitis.
- In adults with moderate hypertriglyceridemia (fasting or non-fasting triglycerides 175–499mg/dL), clinicians should address and treat lifestyle factors (obesity and metabolic syndrome), secondary factors (diabetes,

chronic liver or kidney disease and/or nephrotic syndrome, hypothyroidism), and medications that raise triglycerides.
- In patients with ASCVD or other CV risk factors on a statin with controlled LDL cholesterol but elevated triglycerides (135–499 mg/dL), the addition of icosapent ethyl can be considered to reduce CV risk.
- Statin plus fibrate combination therapy has **not** been shown to improve ASCVD outcomes and is generally not recommended.
- Statin plus niacin combination therapy has **not** been shown to provide additional CV benefit above statin therapy
alone, may increase the risk of stroke with additional side effects, and is generally not recommended.
- Use aspirin therapy (75–162 mg/day) as a secondary prevention strategy in those with diabetes and a history of ASCVD.
- For patients with ASCVD and documented aspirin allergy, clopidogrel (75 mg/day) should be used.
- Dual antiplatelet therapy (with low-dose aspirin and a P2Y12 inhibitor) is reasonable for a year after an acute coronary syndrome and may have benefits beyond this period.
- Long-term treatment with dual antiplatelet therapy should be considered for patients with prior coronary intervention, high ischemic risk, and low bleeding risk to prevent major adverse cardiovascular (MACE) events.
- Combination therapy with aspirin plus low-dose rivaroxaban should be considered for patients with stable CAD and/or PAD and low bleeding risk to prevent major adverse limb and CV events.
- Aspirin therapy (75–162 mg/day) may be considered as a primary prevention strategy in those with diabetes who are at increased CV risk, after a comprehensive discussion with the patient on the benefits versus the comparable increased risk of bleeding.
- In patients with type 2 diabetes with stable HF, metformin may be continued for glucose lowering if eGFR remains >30 mL/min/1.73 m2 but should be avoided in unstable or hospitalized patients with HF.

2- CKD:
- CKD is diagnosed by the persistent elevation of urinary albumin excretion (albuminuria), low eGFR, or other manifestations of kidney damage. CKD attributable to diabetes (DKD). May present at diagnosis of type 2 diabetes. CKD can progress to ESRD requiring dialysis or kidney transplantation and is the leading cause of ESRD in the United States.
- CKD also markedly increases CV risk.
- DKD is a clinical diagnosis made and staged based on the presence and degree of albuminuria and/or reduced eGFR in the absence of signs or symptoms of other primary causes of kidney damage.

Screening:
- At least annually, urinary albumin (e.g., spot UACR) and eGFR should be assessed in all patients with type2 diabetes regardless of treatment.
- Two of three specimens of UACR collected within a 3- to 6-month period should be abnormal before considering a patient to have albuminuria.
- eGFR should be calculated from serum creatinine using a validated formula. (CKD-EPI) equation is generall preferred.
- Patients with diabetes and urinary albumin ≥300 mg/g creatinine and/or an eGFR 30–60 mL/min/1.73 m2 should be monitored twice annually to guide therapy.

Recommendation:
- Metformin may be considered as the initial glucose-lowering medication in the setting of CKD. However, it is contraindicated in patients with an eGFR<30 mL/min/1.73 m2; eGFR should be monitored while taking metformin; the benefits and risks of continuing treatment should be reassessed when eGFR falls to <45 mL/min/1.73 m2; metformin should not be initiated for patients with an eGFR <45 mL/ min/1.73 m2; and metformin should be temporarily discontinued at the time of or before iodinated contrast imaging procedures in patients with eGFR 30–60 mL/min/1.73 m2.
- SGLT2 inhibitors should be given to all patients with stage 3 CKD or higher and type 2 diabetes regardless of

glycemic control, as they slow CKD progression and reduce HF risk independent of glycemic control. Randomized clinical outcome trials have not demonstrated increased risk of acute kidney injury with SGLT2 inhibitor use.

Empagliflozin and dapagliflozin are approved by the FDA for use with eGFR 25–45 mL/min/1.73 m2 for kidney/HF outcomes. Empagliflozin can be started with eGFR >30 mL/min/1.73 m2 (though pivotal trials for each included participants with eGFR $30 mL/min/1.73 m2 and demonstrated benefit in subgroups with low eGFR). Canagliflozin is approved to be initiated to eGFR levels of 30 mL/min/1.73 m2.

- GLP-1 receptor agonists are suggested for CV risk reduction if such risk is a predominant problem, as they reduce risks of CVD events and hypoglycemia and appear to possibly slow CKD progression. Some GLP-1 receptor agonists require dose adjustment for reduced eGFR (the majority— liraglutide, dulaglutide, semaglutide—do not require it).
- Finerenone (MRAs) may reduce CKD progression and CVD in patients with advanced CKD, although monitoring of potassium levels is advised due to the risk of hyperkalemia. It may be used together with SGLT2 inhibitors.

3- Diabetic Retinopathy:

Screening:

- Patients with type 2 diabetes should have an initial dilated and comprehensive eye examination by an ophthalmologist or optometrist at the time of the diabetes diagnosis.
- If there is no evidence of retinopathy for one or more annual eye exams and glycemia is well controlled, then screening every 1–2 years may be considered. If any level of diabetic retinopathy is present, subsequent dilated retinal examinations should be repeated at least annually by an ophthalmologist or optometrist. If retinopathy is progressing or sight-threatening, then examinations will be required more frequently.

Recommendation:

- Promptly refer patients with any level of diabetic macular edema, moderate or worse nonproliferative diabetic retinopathy (a precursor of proliferative diabetic retinopathy), or any proliferative diabetic retinopathy to an ophthalmologist who is knowledgeable and experienced in the management of diabetic retinopathy.
- The presence of retinopathy is not a contraindication to aspirin therapy for cardioprotection, as aspirin does not increase the risk of retinal hemorrhage.

4- Diabetic Neuropathy:

Screening:

- All patients should be assessed for diabetic peripheral neuropathy starting at diagnosis of type 2 diabetes and at least annually thereafter.
- Assessment for distal symmetric polyneuropathy should include a careful history and assessment of either temperature or pinprick sensation (small-fiber function) and vibration sensation using a 128-Hz tuning fork (for large-fiber function).
- All patients should have annual 10-g monofilament testing to identify feet at risk for ulceration and amputation.
- Symptoms and signs of autonomic neuropathy should be assessed in patients with microvascular complications.

Recommendation: Pregabalin, duloxetine, or gabapentin are recommended as initial pharmacologic treatments for neuropathic pain in diabetes.

5- Foot Care:

Screening:

- Perform a comprehensive foot evaluation at least annually to identify risk factors for ulcers and amputations.
- Patients with evidence of sensory loss or prior ulceration or amputation should have their feet inspected at every visit.
- Obtain a prior history of ulceration, amputation, Charcot foot, angioplasty or vascular surgery, cigarette

smoking, retinopathy, and renal disease and assess current symptoms of neuropathy (pain, burning, numbness) and vascular disease (leg fatigue, claudication).

Recommendation:

- The examination should include inspection of the skin, assessment of foot deformities, neurological assessment (10-g monofilament testing with at least one other assessment: pinprick, temperature, vibration), and vascular assessment, including pulses in the legs and feet.
- Patients with symptoms of claudication or decreased or absent pedal pulses should be referred for anklebrachial index and for further vascular assessment as appropriate.
- A multidisciplinary approach is recommended for individuals with foot ulcers and high-risk feet (e.g., dialysis patients and those with Charcot foot or prior ulcers or amputation).
- Refer patients who smoke or who have histories of prior lower-extremity complications, loss of protective sensation, structural abnormalities, or PAD to foot care specialists for ongoing preventive care and lifelong surveillance.
- The use of specialized therapeutic footwear is recommended for high-risk patients with diabetes, including those with severe neuropathy, foot deformities, ulcers, callous formation, poor peripheral circulation, or history of amputation.

6- Older age:

Screening:

- Screen for **geriatric syndromes** (i.e., polypharmacy, cognitive impairment, depression, urinary incontinence, falls, and persistent pain and frailty) in older adults, as they may affect diabetes self-management and diminish quality of life.
- Screening for early detection of mild **cognitive or dementia** should be performed for adults 65 years of age or older at the initial visit and annually as appropriate.

Recommendation:

- **Simplification** of the insulin regimen to match an individual's self-management abilities has been shown to reduce hypoglycemia and disease related distress without worsening glycemic control.

7- Children and adolescent:

- Type 2 diabetes in youth is different not only from type1 diabetes, but also from type 2 diabetes in adults, with a more rapid, progressive decline in b-cell function and accelerated development of diabetes complications.
- Treatment of youth-onset type 2 diabetes by a multidisciplinary team should include lifestyle management, diabetes self-management education, and pharmacologic treatment. Current pharmacologic treatment options
for youth-onset type 2 diabetes are limited to three classes of drugs: insulin, metformin, and, in those ≥10 years of age with no contraindications, GLP-1 receptor agonists indicated for use in youth.
- Consideration of the sociocultural context and efforts to personalize diabetes management are of critical importance to minimize barriers to care, enhance adherence, and maximize response to treatment.
- A reasonable A1C target for most children and adolescents with type 2 diabetes is <7% (53 mmol/mol). More stringent A1C targets (such as <6.5% [48 mmol/mol]) may be appropriate for selected individual patients if they can be achieved without significant hypoglycemia or other adverse effects of treatment. Appropriate patients might include those with short duration of diabetes and lesser degrees of b-cell dysfunction and patients treated with lifestyle or metformin only who achieve significant weight improvement.
- Less stringent A1C goals (such as 7.5%[58 mmol/mol]) may be appropriate if there is increased risk of hypoglycemia.

8- Diabetes in Pregnancy:

- Specific risks of diabetes in pregnancy include spontaneous abortion, fetal anomalies, preeclampsia, fetal demise, macrosomia, neonatal hypoglycemia, hyperbilirubinemia, and neonatal respiratory distress syndrome.
- Diabetes in pregnancy may increase the risk of obesity, hypertension, and type 2 diabetes in offspring later in

life.
- Preconception counseling should address the importance of achieving glucose levels as close to normal as is safely possible, ideally A1C <6.5% (48 mmol/mol).
- In the second and third trimesters A1C <6% has lower risk of complications
- Glucose targets are fasting plasma glucose <95 mg/dL (5.3 mmol/L) and either 1-h postprandial glucose 110-140
mg/dL (7.8mmol/L) or 2-h postprandial glucose 100- 120 mg/dL (6.7 mmol/L).
- Women with preexisting diabetes who are planning a pregnancy should ideally be managed beginning in preconception in a multidisciplinary clinic including an endocrinologist, maternal-fetal medicine specialist, registered dietitian nutritionist, and diabetes care and education specialist, when available.
- Women with preexisting diabetes who are planning pregnancy or who have become pregnant should be counseled on the risk of development and/or progression of diabetic retinopathy. Dilated eye examinations should occur ideally before pregnancy or in the first trimester, and then patients should be monitored every trimester and for 1 year postpartum as indicated by the degree of retinopathy and as recommended by the eye care provider.
- Women with a history of GDM should have lifelong screening for the development of type 2 diabetes or prediabetes every 1–3 years.

Recommendation:
- Lifestyle behavior change is an essential component of management of GDM and may suffice for the treatment of many women. Insulin should be added if needed to achieve glycemic targets.
- Insulin is the preferred medication for treating hyperglycemia in GDM. Metformin and glyburide should not be used as first-line agents, as both cross the placenta.
- Metformin, when used to treat polycystic ovary syndrome and induce ovulation, should be discontinued by the end of the first trimester.
- Telehealth visits for pregnant women with GDM improve outcomes compared with standard inperson care.
- In pregnant patients with diabetes and chronic hypertension, a blood pressure target of 110–135/85 mmHg is suggested in the interest of reducing the risk for accelerated maternal hypertension and minimizing impaired fetal growth.
- Potentially harmful medications in pregnancy (i.e., ACE inhibitors, ARBs, statins) should be stopped at conception and avoided in sexually active women of childbearing age who are not using reliable contraception.
- Screen women with a recent history of GDM at 4–12 weeks postpartum using the 75-g OGTT and clinically appropriate nonpregnancy diagnostic criteria.

9- DIABETES CARE IN THE HOSPITAL
- Hyperglycemia in hospitalized patients is defined as blood glucose levels >140 mg/dL (7.8 mmol/L). Glucose levels persistently above this level should receive prompt conservative interventions to correct the hyperglycemia, such as changes to diet or medications causing hyperglycemia.
- Insulin therapy should be initiated for treatment of persistent hyperglycemia starting at a threshold ≥180 mg/dL (10.0 mmol/L) (checked on two occasions). Once insulin therapy is started, a target glucose range of 140–180 mg/dL (7.8–10.0 mmol/L) is recommended for the majority of critically ill and noncritically ill patients.
- Basal insulin or a basal plus bolus correction insulin regimen is the preferred treatment for noncritically ill hospitalized patients with poor oral intake or those who are taking nothing by mouth.
- An insulin regimen with basal, prandial, and correction components is the preferred treatment for noncritically ill hospitalized patients with good nutritional intake.
- Use of only a sliding scale insulin regimen in the inpatient hospital setting is strongly discouraged.
- In certain circumstances, it may be appropriate to continue home regimens including oral glucose-lowering medications. If oral medications are withheld in the hospital, there should be a protocol for resuming them 1–

2 days before discharge.

Hypoglycemia:

- Occurrence and risk for hypoglycemia should be reviewed at every encounter and investigated as indicated.
- Glucose (approximately 15–20 g) is the preferred treatment for the conscious individual with blood glucose <70 mg/dL (3.9 mmol/L), although any form of carbohydrate that contains glucose may be used. Fifteen minutes after treatment, if BGM shows continued hypoglycemia, the treatment should be repeated. Once the BGM or glucose pattern is trending up, the individual should consume a meal or snack to prevent recurrence of hypoglycemia.
- Insulin-treated patients with hypoglycemia unawareness, one level 3 hypoglycemic event, or a pattern of unexplained level 2 hypoglycemia should be advised to raise their glycemic targets to strictly avoid hypoglycemia for at least several weeks in order to partially reverse hypoglycemia unawareness and reduce risk of future episodes.

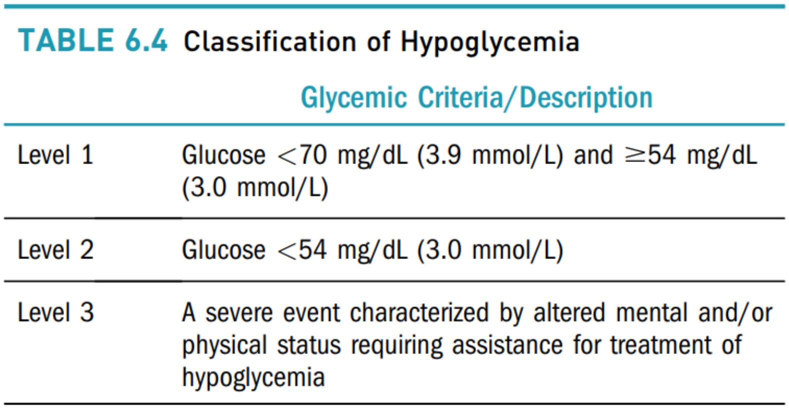
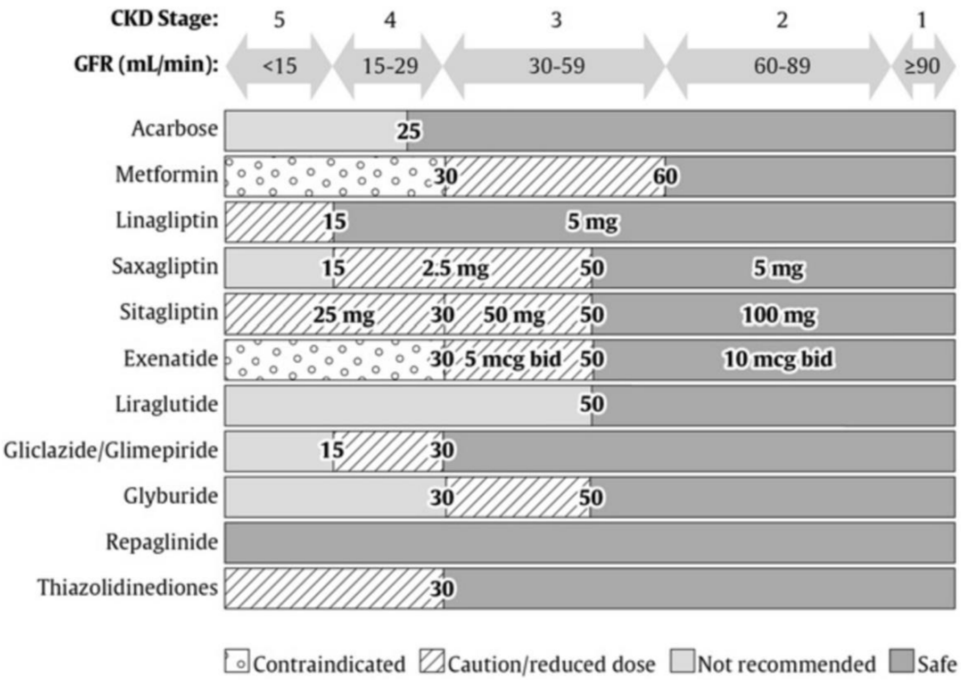


TABLE 6.4 Classification of Hypoglycemia

	Glycemic Criteria/Description
Level 1	Glucose <70 mg/dL (3.9 mmol/L) and ≥54 mg/dL (3.0 mmol/L)
Level 2	Glucose <54 mg/dL (3.0 mmol/L)
Level 3	A severe event characterized by altered mental and/or physical status requiring assistance for treatment of hypoglycemia

Antihyperglycemic Medications and Renal Function



Diabetes Mellitus MCQs

KFMC Midyear 2022

Metformin side effect?

A. Headache
B. Weight gain is a common side effect.
C. Lactic acidosis is a serious side effect.

Answer: C

Best timing to screen for GDM in healthy pregnant lady?

A. 12-14 weeks
B. 16-18 weeks
C. 24-28 weeks
D. 32-36 weeks

Answer: C

You have been asked to see a 75-year-old female who has just had hip surgery to correct a fractured femoral neck. She has a 2-year history of diabetes mellitus treated with pioglitazone (Actos), 30 mg daily, and metformin (Glucophage), 1000 mg twice daily. She is now fully alert and has been able to eat her evening meal. A physical examination is normal except for her being mildly overweight and having a bandage on her left hip. A CBC and chemistry profile done earlier today were normal except for a serum glucose level of 200 mg/dL. Her hemoglobin 1c A at an office visit 2 weeks ago was 6.8%. Which one of the following would be the best management of this patient's diabetes at this time?

A. Stop her usual medications and begin a sliding-scale insulin regimen
B. Stop the metformin only.
C. Decrease the dosage of pioglitazone.
D. Continue with her usual medication regimen.

Answer: D

Current evidence indicates that traditional sliding-scale insulin as the only means of controlling glucose in hospitalized patients is inadequate. For patients in a surgical intensive-care unit, using an insulin drip to maintain tight glucose control decreases the risk of sepsis but has no mortality benefit. Metformin should be stopped if the serum creatinine level is 1.5 mg/dL in men or 1.4 mg/dL in women, or if an imaging procedure requiring contrast is needed. In patients who have not had their hemoglobin A 1c measured in the past 30 days, this could be done to provide a better indication of glucose control. If adequate control has been demonstrated and no contraindications are noted, the patient's usual medication regimen should be continued (SOR B)

KSMC Midyear 2022

A 60-year-old man diagnosed with type 2 diabetes mellitus 6 years ago. Medical history is significant for coronary heart disease, hypertension, hyperlipidemia, and biliary pancreatitis. Medications are Lisinopril, metoprolol, metformin, aspirin, and atorvastatin. On physical examination blood pressure of 152/91 mm Hg, the vital signs are normal. BMI is 27. The physical examination is normal. Laboratory studies show a hemoglobin A1c level of 8.2%.
Which if the following is the most appropriate treatment for this patient?

A. Liraglutide.
B. Empagliflozin.
C. Glipizide.
D. Sitagliptin.

Answer:

Which of the following oral agents used to treat type 2 diabetes mellitus is effective in lowering fasting glucose levels without causing hypoglycemia?

A. Insulin glargine.
B. Glibenclamide.
C. Empagliflozin.
D. Gliclazide.

Answer: C.
Among the oral antiglycemic drugs, the sulfonylurea agents are the most likely to cause hypoglycemia (Glibenclamide and Gliclazide). Insulin also cause hypoglycemia. Empagliflozin are SGLT2i and not causing hypoglycemia.

Which one of the following antihypertensive medications is associated with reduced progression of diabetic kidney disease?

A. Labetalol.
B. Amlodipine.
C. Valsartan.
D. Chlorthalidone.

Answer: C.

ACE inhibitors and angiotensin receptor blockers are associated with decreased progression of diabetic kidney disease. Unless otherwise contraindicated, patients with diabetes should be taking one of these agents. Amlodipine, chlorthalidone and labetalol, are not directly associated with decreased progression of diabetic kidney disease, but they all may contribute to a decrease in progression due to long-term control of blood pressure.

A 60-year-old male with a long-standing history of type 2 diabetes is admitted to the hospital. He takes four oral medications for the treatment of diabetes at home. You decide to switch him to insulin instead of continuing oral medications while he is hospitalized. He is eating his meals well. After calculating the total daily insulin dose, which one of the following would be most appropriate?

A. Administer the total daily dose as long-acting insulin in equal doses every 12 hours.
B. Administer the total daily dose as short-acting insulin in three divided doses, given with each meal.
C. Administer half of the total daily dose of insulin as long-acting insulin and the other half as short-acting insulin in three divided doses, given with each meal.
D. Administer the total daily dose as short-acting insulin in four divided doses, given with each meal and at bedtime.

Answer: C.

Frequently patients taking oral medications for the treatment of diabetes mellitus need to be switched to insulin while hospitalized. There are formulas to calculate the total daily dose based on weight, renal function, insulin resistance, and other factors. The recommended regimen is half of the calculated total daily dose given as longacting insulin such as glargine to provide basal insulin and half given as short- acting insulin such as lispro to provide prandial insulin. The short-acting insulin is divided into thirds to be given with each meal. The American Diabetes Association (ADA) recommends an insulin regimen with a basal and a prandial component for noncritically ill patients in the hospital with good nutritional intake. A correction component can be added to this regimen. The ADA strongly discourages the use of only a sliding scale insulin regimen. The reactive nature of sliding scale does not control glucose levels well and does not address the basal insulin needs of patients.

A 69-year-old male with type 2 diabetes mellitus, obesity, and a history of coronary artery disease sees you for follow-up of his diabetes. His hemoglobin A1c has increased to 8.7% despite therapy with metformin (Glucophage), 1000 mg twice daily, and insulin glargine (Lantus). Which one of the following additional medications would be most effective for reducing his blood glucose level and lowering his risk of cardiovascular events?

A. Gliclazide.
B. Rosiglitazone.
C. Liraglutide.
D. Sitagliptin.

Answer: C.
Liraglutide, exenatide, and dulaglutide are all GLP-1 receptor agonists. Of these, only liraglutide has been shown to lower the risk of recurrent cardiovascular events and has received FDA approval for this indication. Glipizide (a sulfonylurea), rosiglitazone, and sitagliptin have not been associated with improved cardiovascular outcomes. Empagliflozin, an SGLT2 inhibitor, has also been associated with secondary prevention of cardiovascular disease.

A 62-year-old white male with a 3-month history of diabetes mellitus has a hemoglobin A1c of 7.8%. Which one of the following is the best parameter for determining if he can safely take metformin?

A. Serum creatinine.
B. Urine microalbumin.
C. Estimated glomerular filtration rate.
D. BUN/creatinine ratio.

Answer: C.
Until recently metformin was contraindicated for patients with renal dysfunction suggested by a creatinine level of 1.5 mg/dL for men and 1.4 mg/dL for women. However, available evidence now supports the use of metformin in individuals with mild to moderate chronic renal disease, defined by the estimated glomerular filtration rate (eGFR). Patients with an eGFR between 45 and 60 mL/min/1.73 m2 (chronic mild kidney disease) are now permitted to take metformin. Metformin should not be used in patients with an eGFR <45 mL/min/1.73 m2 (moderate kidney disease), as lactic acidosis is more likely to occur. The eGFR is used instead of the serum creatinine level because the equation includes age, sex, race, and other parameters.

A 54-year-old male known to have diabetes following up with you due to poor control of his disease. He is not very adherent to his diet and exercise and therefore gaining weight (BMI 34 kg/m2). He is on Metformin 1000 mg twice daily, Sitagliptin 100 mg once daily, Glibenclamide 5 mg once daily. His A1C is 8.9%. After emphasizing on diet and exercise, and obtain efficient history. What is the best next step in his management?

A. Start Liraglutide 0.6 mg.
B. Start Rosiglitazone.
C. Start Empagliflozin 10 mg.
D. Switch Glibenclamide with Gliclazide 60 mg.

Answer: C.

You are treating a 60-year-old man with a history of stable angina, he is on Bisoprolol 5 mg and Lisinopril 5 mg. His other medical history is diabetes mellitus type 2 on metformin and sitagliptin, his last labs as following:
Total cholesterol .... 270 mg/dl (6.9 mmol/L)
LDL .... 131 mg/dl (3.38 mmol/L)
HDL .... 48 mg/dl (1.24 mmol/L)

HBA1c …………………………………………… 6.9 %
What is the most appropriate treatment at this time?

A. Prescribe Atorvastatin 40 mg.
B. Prescribe Fenofibrate 200 mg.
C. Prescribe Atorvastatin 10 mg.
D. Prescribe Simvastatin 40 mg.

Answer: A.
Since the patient has established ASCVD, secondary prevention with high intensity statin should be given.

A 53-year-old female patient started medication for her diabetes, complaining of shortness of breath and lower limbs swelling. On examination there are bilateral basal crackles and lower limbs edema. What is the medication responsible for these symptoms?

A. Biguanides.
B. Thiazolidinediones.
C. DPP-IV inhibitor.
D. SGLT2i.

Answer: B.
Fluid retention is one of Thiazolidinediones (TZD) side effect. Therefore, it is generally not recommended in renal impairment. Weight gain is expected. FDA Black Box: Congestive heart failure.

A 62-year-old female with type 2 diabetes on metformin 1 gm BID, sitagliptin 100 mg once insulin 36 IU at night. He has been complaining of fatigue, tremor and sweating at 3 am with sweating and her daily glucose reading show:
10 pm: 90 mg/dl
3 am: 50 mg/dl
8 am: 200 mg/dl
What is your management?

A. Decrease the basal insulin at evening dose.
B. Stop insulin and start sulfonylurea at breakfast time.
C. Stop taking snack at bedtime.
D. Increase insulin dose.

Answer: A.
This is what is known as “Somogyi Hypothesis” which is discredited in some references. It is advised to decrease the basal insulin dose and eat a snack at bedtime.

A 61-year-old white male with type 2 diabetes mellitus sees you for a follow-up visit. His blood pressure is 156/94 mm Hg. At a visit 1 week ago, his blood pressure was 150/92 mm Hg. Laboratory studies obtained prior to this visit show a BUN of 16 mg/dL (N 6–20), a serum creatinine level of 0.9 mg/dL (N 0.7–1.3), and microalbuminuria on a urinalysis. His diabetes is well controlled with metformin (Glucophage) and he is taking aspirin.
Which one of the following would you recommend?

A. Observation only.
B. An ACE inhibitor.
C. A calcium channel blocker.
D. Hydrochlorothiazide.

Answer: B.
The panel members of the Eighth Joint National Committee for the management of blood pressure recommended that ACE inhibitors should be initiated for renal protection in adults with diabetes mellitus, hypertension, and microalbuminuria. This patient appears to be in an early stage of nephropathy, and ACE inhibitors will reduce the decline in renal function. B-Blockers are no longer recommended for first-line treatment. In white patients who do not have diabetes, therapy may be started with ACE inhibitors, thiazide diuretics, or calcium channel blockers.

Which one of the following antidiabetic medications causes candidiasis?

A. DPP4 inhibitors such as sitagliptin.
B. GLP1 agonist such as liraglutide.
C. SGLT2 inhibitor such as canagliflozin.

Answer: C.
SGLT2 inhibitors inhibit SGLT2 in the proximal nephron. This blocks glucose reabsorption by the kidney, increasing glucosuria. The advantages of this medication include no hypoglycemia, decreased weight, decreased blood pressure, and effectiveness at all stages of type 2 diabetes mellitus. Disadvantages are that it increases the risk of genitourinary infections, polyuria, and volume depletion and increases LDL- cholesterol and creatinine levels.

Which one of the following is more suggestive of DMI than DMII?

A. Increased c-peptide.
B. Islet cells antibodies.

Answer: B.

C-terminal peptide is cleaved from natively produced insulin. Fasting C-peptide levels are markedly elevated in patients with T2DM, but in people with T1DM, C-peptide levels should be low due to the absence of native insulin. Microalbuminuria, markedly elevated hemoglobin A1C, and peripheral neuropathy can all occur in type 1 or 2 diabetes. T1DM is caused by autoimmune destruction of the pancreatic islet cells and the antibody glutamic acid decarboxylase (GAD 65) is most commonly used to diagnose T1DM.

A 75-year-old female with a 10-year history of type 2 diabetes mellitus presents with moderate bilateral burning pain in the distal portion of her feet. Her hemoglobin A1c is 8.1%. Which one of the following is

A. Amitriptyline.
B. Ibuprofen.
C. Pregabalin (Lyrica).
D. Tramadol (Ultram).

Answer: C.
Pregabalin, duloxetine, or gabapentin are recommended as initial pharmacologic treatments for neuropathic pain in diabetes (SOR A).

A 57-year-old female with diabetes mellitus comes to your office for a routine follow-up. Her current medications include metformin (Glucophage), 1000 mg twice daily. She tells you that she does not exercise regularly and finds it difficult to follow a healthy diet. A hemoglobin A1c today is 7.5%. She does not want to add medication sat this time, but she does want to get her hemoglobin A1c below 7%, which is the goal that was previously discussed. Which one of the following would be the most effective way to improve glucose control for this patient?

A. Discuss the components of a healthy diabetic diet and encourage her to follow it more closely.
B. Discuss the importance of regular exercise and encourage her to exercise 30–45 minutes daily.
C. Recommend that she check her glucose level 1–3 times daily to help determine what adjustments need to be made.
D. Start her on an additional medication.
E. Refer her to a diabetes educator for medical nutrition therapy.

Answer: E.
Counseling by a diabetic educator or team of educators for medical nutrition therapy lowers hemoglobin A1c by 0.2–0.8 percentage points in patients with type 2 diabetes. While a healthy diabetic diet and regular exercise are important, simply reminding the patient of that fact is not likely to be as successful as comprehensive diabetic education. According to the Society of General Internal Medicine in the Choosing Wisely campaign, patients with type 2 diabetes who are not on insulin therapy should not check their blood glucose level daily. An additional medication will likely decrease the hemoglobin A1c, but this patient has expressed a desire to avoid additional medication, is near goal, and is not currently managing her diabetes with adequate lifestyle changes, so it would be appropriate to respect her wishes and pursue proven interventions that do not require medication.

A 45-year-old female comes to your office for an annual health maintenance visit. She has a family history of type 2 diabetes in her mother and a personal history of obesity for many years. If verified with a second test, which one of the following would confirm a diagnosis of diabetes mellites?

A. Hemoglobin A1c of 6.4%.
B. A 2-hour plasma glucose level of 190 mg/dL on an oral glucose tolerance test.
C. A random glucose level of 190 mg/Dl.
D. A fasting plasma glucose level of 130 mg/dL.

Answer: D.

A diagnosis of type 2 diabetes can be based on any of the following test results: a hemoglobin A1c ≥6.5%, a fasting plasma glucose level ≥ 126 mg/dL, a 2-hour plasma glucose level ≥200 mg/dL on an oral glucose tolerance test, or a random plasma glucose level ≥200 mg/dL with classic symptoms of hyperglycemia.

A 72-year-old female with a history of type 2 diabetes presents with a 4-month history of a burning sensation along her tongue. Her diabetes is currently well controlled with Metformin. Her other medications include Atorvastatin and Lisinopril. Her past medical history is otherwise unremarkable. An examination reveals a smooth, glossy, erythematous tongue (shown below). A laboratory evaluation should include which one of the following tests?

A. Angiotensin converting enzyme.
B. Antineutrophil cytoplasmic antibody.
C. Serotonin.
D. TSH.
E. Vitamin B12.

Answer: E.

The history and physical examination in this case are consistent with atrophic glossitis. Routine vitamin B12 monitoring or supplementation is appropriate for patients who take metformin chronically. A decline in vitamin B12 levels may be seen as early as 3–4 months after starting metformin. Atrophic glossitis can be associated with several different conditions, but this patient's age and metformin use put her at risk for vitamin B12 deficiency. This is not a common presentation for thyroid disease, sarcoidosis, autoimmune vasculitis, or carcinoid syndrome, which can sometimes be associated with a niacin deficiency.

A 30-year-old female with type 2 diabetes and obesity sees you for follow-up. She Has experienced several episodes of symptomatic hypoglycemia, and because of this she stopped all of her medications except metformin (Glucophage). Her hemoglobin A1c has increased to 8.4%. Which one of the following would be the best additional treatment for this patient?

A. Basal insulin (Lantus).
B. Rapid-acting insulin (Humalog).
C. Exenatide (Byetta).
D. Glipizide (Glucotrol).
E. Repaglinide.

Answer: C.

Exenatide is a GLP-1 receptor agonist that is not associated with hypoglycemia and can also assist with weight loss, which would be helpful in this patient with obesity. All of the other listed medications, including both types of insulin, sulfonylureas, and meglitinides, can be associated with hypoglycemia. Since this patient's hemoglobin A1c is only moderately elevated at 8.4%, exenatide is reasonable, although it can be an expensive option. If her hemoglobin A1c was severely elevated, insulin would be indicated, with close monitoring for hypoglycemia.

A 35-year-old male with type 1 diabetes asks you what his hemoglobin A1c goal should be. His blood pressure and lipids are well controlled and he has not had any episodes of hypoglycemia. He recently saw an ophthalmologist and a podiatrist. You advise him that based on current American Diabetes Association recommendations his goal should be to keep his hemoglobin A1c below a threshold value of:

A. 6.0%.
B. 7.0%.
C. 8.0%.
D. 9.0%.

Answer: B.

Tight glucose control in patients with type 1 diabetes helps prevent microvascular complications such as cardiovascular disease, neuropathy, nephropathy, and retinopathy. The American Diabetes Association recommends a hemoglobin A1c goal of <7.0% for nonpregnant adults. Glycemic targets may be higher in older adults, and in patients with functional impairments, limited life expectancy, or multiple comorbidities.

A 55-year-old female with type 2 diabetes sees you because of early satiety, nausea, vomiting, bloating, and postprandial fullness that is sometimes accompanied by upper abdominal pain. Since these symptoms have developed she has also noted increasing difficulty with blood glucose control. Which one of the following would be the study for confirming the most likely diagnosis?

A. Gastric emptying scintigraphy with a solid meal.
B. Hepatobiliary scintigraphy (HIDA).
C. An upper gastrointestinal series with small-bowel follow-through.
D. Abdominal ultrasonography.
E. Abdominal CT.

Answer: A.

Gastroparesis is a complication of diabetes mellitus, and presents with nausea, vomiting, early satiety, bloating, postprandial fullness, and/or upper abdominal pain. Gastric emptying scintigraphy with a solid meal is the first line study for confirming the diagnosis. Hepatobiliary scintigraphy (HIDA) is used to evaluate biliary dyskinesia and is not indicated in this patient. An upper gastrointestinal radiographic series, abdominal ultrasonography, and CT of the abdomen can help to rule out obstructive pathology, biliary tract disease, and other gastrointestinal conditions but would not confirm the diagnosis. The patient should also undergo esophagogastroduodenoscopy to exclude obstruction.

A 60-year-old male who has type 2 diabetes comes to your office with an acute onset of fever, chills, and malaise. He says that he is feeling progressively worse. His temperature is 40°C (104°F). An examination reveals redness, tenderness, and swelling of the penis, scrotum, and perineal area. Which one of the following medications is most likely to cause this condition?

A. Dapagliflozin (Farxiga).
B. Exenatide (Byetta).
C. Insulin glargine (Lantus).
D. Pioglitazone (Actos).
E. Sitagliptin (Januvia).

Answer: A.
SGLT2 inhibitors (canagliflozin, dapagliflozin, empagliflozin, and ertugliflozin) are associated with a higher rate of genitourinary infections, including necrotizing fasciitis of the perineum (Fournier's gangrene). While rare, this is a life-threatening infection associated with this class of medications that is being used more frequently to treat diabetes mellitus. Because of this risk, the FDA issued a Drug Safety Warning in 2018 due to case reports. The drug classes that include exenatide, insulin glargine, pioglitazone, and sitagliptin are not associated with this condition.

A 45-year-old female with a 4-year history of type 2 diabetes is taking only metformin (Glucophage) and maintaining a hemoglobin A1c of 6.6%. Her LDL-cholesterol level is 94 mg/dL. She has no complications related to diabetes and her medical history is otherwise unremarkable. Which one of the following should be added to her current medication regimen?

A. A DPP-4 inhibitor.
B. An SGLT2 inhibitor.
C. A low-intensity statin.
D. A moderate-intensity statin.
E. A high-intensity statin.

Answer: D.
All patients between 40 and 75 years of age with diabetes mellitus and an LDL-cholesterol level ≥70 mg/dL should begin taking a moderate-intensity statin. It is not necessary to calculate a 10-year risk for atherosclerotic cardiovascular disease because the results do not alter the recommendation. This patient's hemoglobin A1c is

<7%, which is acceptable, and she does not need additional hypoglycemic medications. She has no diabetesspecific risk-enhancing conditions such as a long duration of illness, chronic kidney disease, retinopathy, neuropathy, or an ankle-brachial index <0.9. Older age and risk-enhancing conditions may require increasing the statin to high-intensity dosages. A DPP-4 inhibitor, an SGLT2 inhibitor, and a low-intensity statin would not be appropriate for this patient at this time.

A 68-year-old female comes to your office for a follow-up visit for diabetes mellites. Her home glucose monitor record shows a range of 68–125 mg/dL. Her medications include Atorvastatin (Lipitor), 40 mg daily; metformin (Glucophage), 750 mg twice daily; and insulin glargine (Lantus), 10 U nightly. Laboratory studies are remarkable for a hemoglobin A1c of 5.8% and a creatinine level of 0.98 mg/dL (N 0.6–1.1). She maintains healthy lifestyle behaviors such as walking 30 minutes 5 days per week and avoiding sweetened beverages. Which one of the following would be the most appropriate treatment plan?

A. Continue the current medication regimen.
B. Increase the insulin glargine dosage.
C. Increase the metformin dosage.
D. Discontinue insulin glargine.
E. Discontinue metformin.

Answer: D.

According to the ACCORD (Action to Control Cardiovascular Risk in Diabetes) and ADVANCE (Action in Diabetes and Vascular Disease: Preterax and Diamicron MR Controlled Evaluation) trials, aggressive management of diabetes mellitus to achieve a hemoglobin A1c <6.5% increases the risk of patient harm and does not provide clinical benefit. Insulin glargine increases the risk of hypoglycemia, which this patient reports. In addition, it is expensive and more complex to administer insulin compared to an oral medication. Since this patient is on a starting dosage of insulin glargine and her hemoglobin A1c is well below 6.5%, she should discontinue insulin glargine and maintain metformin as a first-line choice that is well tolerated.

A 12-year-old male with type 1 diabetes is brought to your office for routine follow-up. Laboratory work performed prior to the appointment shows an LDL-cholesterol level of 120 mg/dL. In addition to counseling the patient on a heart-healthy diet and daily physical activity, which one of the following would you recommend?

A. No additional measures.
B. Fish oil supplements.
C. Atorvastatin (Lipitor).
D. Ezetimibe (Zetia).
E. Gemfibrozil (Lopid).

Answer: C.

Pediatric type 1 diabetes is recognized as a high-risk condition for the future development of cardiovascular disease. Current guidelines recommend initiating a statin, in addition to education regarding a healthy diet and physical activity, for pediatric patients in this high-risk category with an LDL-cholesterol level >100 mg/dL. Statins such as atorvastatin are recommended for first-line treatment according to multiple studies that demonstrate their efficacy and benefits in reduction of cardiovascular morbidity and mortality, along with long term studies demonstrating their safety. Fish oil supplements, ezetimibe, and gemfibrozil would not be appropriate recommendations for this patient at this time.

A 50-year-old male with newly diagnosed type 2 diabetes asks how to reduce his risk of diabetic retinopathy progression. You tell him that in addition to maintaining good glycemic control, the risk can be reduced by:

A. Corticosteroid eye drops.
B. An ACE inhibitor.
C. Aspirin therapy.
D. Blood pressure control.
E. Lipid management.

Answer: D.
The risk of diabetic retinopathy progression can be modified by good glycemic control, maintaining a hemoglobin A1c <7%, maintaining a blood pressure <140/90 mm Hg, and undergoing periodic eye examinations. Corticosteroid eye drops are not appropriate to reduce the risk of diabetic retinopathy. ACE inhibitors are used to help prevent nephropathy. Aspirin therapy and lipid management have no effect on the progression of diabetic retinopathy.

A 22-year-old gravida 1 para 0 was recently diagnosed with gestational diabetes. Her fasting blood glucose levels have consistently been 120–130 mg/dL since she began following nutrition and exercise recommendations. Based on guidelines from the American Diabetes Association and the American College of Obstetricians and Gynecologists, which one of the following would be preferred at this point?

A. No change in management.
B. Loosening the calorie restrictions.
C. Adding glyburide.
D. Adding insulin.
E. Adding metformin (Glucophage).

Answer: D.
Pharmacologic treatment should be initiated in patients with gestational diabetes mellitus (GDM) when nutrition and exercise therapy are not adequate to meet goals. Accepted goals are fasting blood glucose levels <95 mg/dL, 1-hour postprandial glucose levels <140 mg/dL, and 2-hour glucose levels <120 mg/dL. Although oral antidiabetic medications are being used more frequently in GDM, insulin is the preferred treatment recommended by the American Diabetes Association and the American College of Obstetricians and Gynecologists. Oral medication may be initiated in patients who refuse insulin or are unable to comply with insulin management. This recommendation is made predominantly because metformin has not shown superiority and there is a lack of long-term outcome studies in the offspring exposed to metformin. Glyburide has not shown outcomes equivalent to those of metformin or insulin.

A 55-year-old male with a BMI of 32 kg/m2 presents to your office to discuss weight management. He has moderately well controlled type 2 diabetes and hypertension. He prefers not to modify his diet and would like to know if he can expect significant weight loss from exercising. He plans to walk briskly for 45 minutes daily. Which one of the following would be the best advice for this patient?

A. Moderate exercise alone is ineffective for weight loss.
B. Moderate exercise alone is superior to dietary changes for weight loss.
C. Moderate exercise alone is moderately beneficial for weight loss.
D. Adding moderate exercise to dietary changes substantially increases weight loss.

Answer: C.

Exercise alone does have some substantial benefits, including improved insulin and glycemic control in diabetes, a beneficial effect on blood pressure, a reduction of cardiovascular risks, and a maintenance of weight loss. However, it is only moderately beneficial for promoting weight loss, including when exercise is added to diet changes.

An obese 45-year-old female returns for follow-up to discuss recent laboratory results. She has known hypertension and takes amlodipine (Norvasc), 5 mg daily. She has bilateral knee osteoarthritis and uses ibuprofen as needed for pain. Recent laboratory studies show a fasting glucose level of 120 mg/dL, normal electrolytes, and normal kidney and liver function. She has a total cholesterol level of 203 mg/dL, an LDLcholesterol level of 134 mg/dL, an HDL-cholesterol level of 46 mg/dL, and a triglyceride level of 260 mg/dL. She has a strong family history of diabetes mellitus and cardiovascular disease. Which one of the following has been shown to be most effective in preventing diabetes in patients such as this?

A. Participation in the National Diabetes Prevention Program.
B. Acarbose (Precose).
C. Liraglutide (Victoza).
D. Metformin (Glucophage).

Answer: A.

Patients who participate in long-term lifestyle intervention programs such as the CDC's National Diabetes Prevention Program have an approximately 30% reduction in progression to type 2 diabetes. These programs promote weight loss of 7% of body weight and encourage physical activity with a weekly goal of 150 minutes of moderate-intensity exercise. Because an estimated 1 in 3 adults in the United States has prediabetes (diagnosed by a fasting glucose level of 100–125 mg/dL, a hemoglobin A1c of 5.7%–6.4%, or a 2-hour plasma glucose level of 140–199 mg/dL), interventions to reduce progression to full diabetes are vital. Weight loss of 5% of body weight alone is not as effective as a comprehensive prevention program.

A 34-year-old female with type 2 diabetes that had previously been managed with metformin (Glucophage) and liraglutide (Victoza) was switched to insulin for glycemic management during her pregnancy. In the week before delivery she was achieving fasting and postprandial glucose targets with an insulin regimen of insulin detemir (Levemir), 16 U daily, and insulin lispro (Humalog), 4 U with meals. Her labor was induced at 37 weeks gestation due to elevated blood pressures and she had an uncomplicated vaginal delivery. She is planning to breastfeed. Which one of the following glucose management regimens would you recommend for her in the immediate postpartum period?

A. Continue the current dosages of insulin.
B. Continue insulin detemir and stop insulin lispro.
C. Continue insulin lispro and stop insulin detemir.
D. Discontinue insulin and reinitiate metformin.
E. Discontinue insulin and reinitiate liraglutide.

Answer: D.

The incidence of type 2 diabetes continues to rise in the United States, including in women of childbearing age. Type 2 diabetes complicates 1%–2% of pregnancies in the United States. Tight glycemic control (hemoglobin A1c <6.5%) is recommended during pregnancy, especially in the preconception period and the first trimester if possible. Risks of uncontrolled diabetes in pregnancy include preeclampsia, congenital defects, preterm delivery, macrosomia, and stillbirth. Insulin is the safest medication for glycemic control in pregnant patients, with requirements to achieve glycemic targets typically varying over the course of a pregnancy. After an initial increase in insulin requirements through week 9 of pregnancy, they often decline in weeks 9–16 before rising again in weeks 16–37. Beyond week 37 insulin requirements may again start to decline. Immediately after delivery of the placenta women become exquisitely sensitive to insulin, and insulin requirements may drop as low as 50% of pre-pregnancy needs. Patients with type 2 diabetes who were not taking insulin prior to pregnancy typically no longer require insulin. Metformin is safe in breastfeeding women and should be restarted in this patient who did well on it prior to pregnancy. No information is available regarding the safety of liraglutide while breastfeeding. Until more data becomes available it should be used with caution and is not the preferred agent in this patient.

A 16-year-old Muslim male with type 1 diabetes would like to start fasting during Ramadan. He currently takes insulin glargine (Lantus) every morning and regular insulin with meals. Which one of the following is the most appropriate recommendation for this patient during Ramadan?

A. Avoid fasting because it is unsafe in patients with type 1 diabetes.
B. Decrease insulin glargine by 50%.
C. Decrease insulin glargine by 50% and take it at night.
D. Decrease insulin glargine by 25% and use sliding scale regular insulin with meals.
E. Stop insulin glargine and use sliding scale regular insulin four times a day.

Answer: A.

Ramadan is a holy month during which Muslims fast from dawn until sunset. It is an obligation for all healthy adult Muslims. The Quran does exempt the sick from fasting, but many ill people will still fast. Recommendations in the literature include risk stratification criteria to determine whether fasting is safe for patients with diabetes mellitus. Generally, patients with well controlled type 2 diabetes can safely fast with adjustments in their medications; however, it is thought that fasting is unsafe for patients with type 1 diabetes. Fasting can increase the risk of severe hypoglycemia as well as hyperglycemia and ketoacidosis if medications are withheld.

A 38-year-old male comes to your office for follow-up of his diabetes mellitus. He takes metformin (Glucophage) and dulaglutide (Trulicity) and his hemoglobin A1c is 6.5%. He has an LDL-cholesterol level of 110 mg/dL, an HDL cholesterol level of 55 mg/d, and a triglyceride level of 170mg/dL. He asks your advice about statin therapy for colesterol management. You advise him to start:

A. A low-intensity statin now.
B. A moderate-intensity statin now.
C. Statin therapy at 40 years of age.
D. Statin therapy when his 10-year ASCVD risk is >5%.

Answer: C.
There is high-quality evidence from randomized, controlled trials that a moderate-intensity statin should be initiated for all patients age 40–75 years with diabetes mellitus regardless of their calculated 10-year atherosclerotic cardiovascular disease (ASCVD) risk. There is no strong evidence supporting the use of statins before age 40 in patients with diabetes unless their LDL-cholesterol level is very high. The ASCVD risk score is valid for patients over 40 years of age and cannot be calculated before then.

A 57-year-old female is admitted to the hospital with lower lobe pneumonia. She has no history of diabetes mellitus. She has not met sepsis criteria but had a blood glucose level of 172 mg/dL in the emergency department. Insulin should be started if this patient has a persistent blood glucose level greater than or equal to:

A. 120 mg/dL.
B. 140 mg/dL.
C. 160 mg/dL.
D. 180 mg/dL.

Answer: D.
Insulin therapy should be initiated in hospitalized patients with persistent hyperglycemia, starting at a threshold of 180 mg/dL. Once insulin therapy is started, a target glucose range of 140–180 mg/dL is recommended for the majority of hospitalized patients, regardless of whether they have a critical illness.

Which one of the following comorbidities would falsely lower the hemoglobin A1c level in a patient with type 2 diabetes melliStus?

A. Vitamin B12 deficiency.
B. Iron deficiency anemia.
C. Hemolytic anemia.

D. Chronic kidney disease.
E. A history of splenectomy.

Answer: C.

Several factors can alter the hemoglobin A1c value, including variability and erythrocyte lifespan. When the mean erythrocyte lifespan is increased by a condition such as asplenia, hemoglobin A1c increases because of increased RBC exposure time for glycation. Conversely, when the mean erythrocyte lifespan is decreased by conditions such as hemolytic anemia, hemoglobin A1c is decreased because of reduced RBC exposure time for glycation. Conditions that decrease erythropoiesis, such as iron deficiency anemia, increase the mean age of the RBC, thereby increasing hemoglobin A1c. Severe chronic kidney disease may increase RBC glycation through lipid peroxidase of hemoglobin and by extending the erythrocyte lifespan due to decreased erythropoietin levels, causing a false elevation of hemoglobin A1c. Vitamin B12 deficiency also decreases erythropoiesis and leads to falsely elevated hemoglobin A1c.

A 38-year-old female presents for ongoing management of type 2 diabetes mellitus, obesity, and chronic abdominal pain related to her history of recurrent pancreatitis. She says that her self-monitored blood glucose has been running in the range of 200–300 mg/dL on most occasions. She is not currently taking any medications but has tried metformin (Glucophage) and extended-release metformin (Glucophage XR) unsuccessfully in the past. On both occasions she experienced worsening abdominal pain and diarrhea. She does not feel she can manage insulin and requests an oral medication. Her hemoglobin A1c in your office today is 9.0%. In addition to lifestyle and nutrition counseling, which one of the following would be the best treatment at this time?

A. Restart metformin.
B. Start empagliflozin (Jardiance).
C. Start liraglutide (Victoza).
D. Start sitagliptin (Januvia).

Answer: B.

Metformin should be used as first-line therapy in type 2 diabetes to reduce microvascular complications, assist in weight management, reduce the risk of cardiovascular events, and reduce the risk of mortality in patients (SOR A). Patients who are intolerant of metformin are unlikely to be successful with a third trial of that agent. Empagliflozin, an SGLT2 inhibitor, is considered a second-line choice for patients who are intolerant of metformin. Both sitagliptin, a DPP-4 inhibitor, and liraglutide, a GLP-1 receptor agonist, should be avoided or used with caution in patients with a history of pancreatitis.

A 73-year-old female is brought to your office by her daughter, who is concerned that there may be some memory changes in her mother. She has noticed that her mother frequently repeats herself and has made several medication errors lately. The patient has type 2 diabetes mellitus, hypertension, depression, and hypothyroidism. Her current medications include glyburide (DiaBeta), aspirin, lisinopril (Prinivil, Zestril), hydrochlorothiazide, atorvastatin (Lipitor), and sertraline (Zoloft). A physical examination reveals a blood pressure of 136/72 mm Hg. She scores 26/30 on a Saint Louis University Mental Status (SLUMS) examination, which suggests mild cognitive impairment. A cardiac examination and a foot examination are normal. Laboratory studies reveal a hemoglobin A1c of 7.0% and a TSH level of 3.8 U/mL (N 0.4–4.2). A basic metabolic panel is normal, and her glucose level is 93 mg/dL. A CBC is normal. Which one of the following medications should be stopped in this patient?

A. Atorvastatin.
B. Glyburide.
C. Hydrochlorothiazide.
D. Lisinopril.
E. Sertraline.

Answer: B.

This patient has signs of mild neurocognitive impairment. In this case one possible contributor to this condition is hypoglycemia. While it is unknown whether minor hypoglycemic events can contribute to dementia, major events have been associated with a greater risk of dementia. The sulfonylurea glyburide carries a risk of significant hypoglycemia, especially in elderly patients. Her hemoglobin A1c of 6.1% correlates with an estimated average glucose of 128 mg/dL, corroborating this concern. Glyburide in particular is listed on the Beers Criteria because of its potential to cause prolonged hypoglycemia.

Which one of the following diabetes mellitus medications is MOST likely to cause weight gain?

A. Empagliflozin (Jardiance).
B. Glimepiride (Amaryl).
C. Liraglutide (Victoza).
D. Metformin (Glucophage).
E. Sitagliptin (Januvia).

Answer: B.

Since many patients with diabetes mellitus are obese, the impact of medications on the patient's weight is important to consider. Treatment with sulfonylureas, including glimepiride, is associated with weight gain. Empagliflozin, liraglutide, metformin, and sitagliptin are not associated with weight gain. In particular, the SGLT2 inhibitors such as empagliflozin and the GLP1 agonists such as liraglutide are associated with clinically significant weight loss.

The U.S. Preventive Services Task Force recommends routine screening for gestational diabetes mellitus no sooner than:

A. 16 weeks gestation.
B. 20 weeks gestation.
C. 24 weeks gestation.
D. 32 weeks gestation.

Answer: C.

The U.S. Preventive Services Task Force recommends screening for gestational diabetes mellitus after 24 weeks gestation with a fasting blood glucose level, a 50-g oral glucose challenge, or an assessment of risk factors (A recommendation). Screening at an earlier date receives a rating of insufficient evidence, and screening at later dates is not recommended (SOR C).

A 69-year-old male with type 2 diabetes mellitus, obesity, and a history of coronary artery disease sees you for follow-up of his diabetes. His hemoglobin A1c has increased to 8.7% despite therapy with metformin (Glucophage), 1000 mg twice daily, and insulin glargine (Lantus). Which one of the following additional medications would be most effective for reducing his blood glucose level and lowering his risk of cardiovascular events?

A. Exenatide (Byetta).
B. Glipizide (Glucotrol).
C. Liraglutide (Victoza).
D. Rosiglitazone (Avandia).
E. Sitagliptin (Januvia).

Answer: C.

Liraglutide, exenatide, and dulaglutide are all GLP-1 receptor agonists. Of these, only liraglutide has been shown to lower the risk of recurrent cardiovascular events and has received FDA approval for this indication. Glipizide (a sulfonylurea), rosiglitazone, and sitagliptin have not been associated with improved cardiovascular outcomes. Empagliflozin, an SGLT2 inhibitor, has also been associated with secondary prevention of cardiovascular disease.

A 36-year-old female sees you for a 6-week postpartum visit. Her pregnancy was complicated by gestational diabetes mellitus. Her BMI at this visit is 33.0 kg/m2 and she has a family history of diabetes. Which one of the following is this patient's greatest risk factor for developing type 2 diabetes in the future?

A. Her age.
B. Obesity.
C. The history of a completed pregnancy.
D. The history of gestational diabetes.
E. The family history of diabetes.

Answer: D.

A history of gestational diabetes mellitus (GDM) is the greatest risk factor for future development of diabetes mellitus. It is thought that GDM unmasks an underlying propensity to diabetes. While a healthy pregnancy is a diabetogenic state, it is not thought to lead to future diabetes. This patient's age is not a risk factor. Obesity and family history are risk factors for the development of diabetes, but having GDM leads to a fourfold greater risk of developing diabetes, independent of other risk factors (SOR C). It is thought that 5%–10% of women who have GDM will be diagnosed with type 2 diabetes within 6 months of delivery. About 50% of women with a history of GDM will develop type 2 diabetes within 10 years of the affected pregnancy.

A 55-year-old male sees you for follow-up. His medical problems include morbid obesity, type 2 diabetes mellitus, hypertension, hyperlipidemia, and major depressive disorder. His medications include metformin (Glucophage), glipizide (Glucotrol XL), lisinopril (Prinivil, Zestril), aspirin, simvastatin (Zocor), and fluoxetine (Prozac). His BMI is 52.4 kg/m2 and he is struggling to lose weight. Which one of the following medication replacements could help promote weight loss?

A. Atorvastatin (Lipitor) instead of simvastatin.
B. Canagliflozin (Invokana) instead of glipizide.
C. Carvedilol (Coreg) instead of lisinopril.
D. Paroxetine (Paxil) instead of fluoxetine.
E. Pioglitazone (Actos) instead of glipizide.

Answer: B.

Given the obesity epidemic in the United States, an awareness of therapies that affect weight is imperative for family physicians. This patient is taking medications that help with weight loss (metformin) and medications that are weight neutral (lisinopril, simvastatin, and fluoxetine). Glipizide, however, causes weight gain, and switching to an SLGT2 inhibitor such as canagliflozin can help promote weight loss. Likewise, the patient could use a GLP-1 receptor agonist such as exenatide or an amylin mimetic (pramlintide) for weight loss benefits. Sulfonylureas, thiazolidinediones, and insulins all promote weight gain (SOR A). Fluoxetine and sertraline are weight neutral, swhereas paroxetine can cause weight gain (SOR B). The statins are weight neutral in general, and switching to atorvastatin should not affect weight. ACE inhibitors, angiotensin receptor blockers, calcium channel blockers, thiazides, and -adrenergic blockers are all weight neutral. In this patient with diabetes mellitus, an ACE inhibitor would be preferable to carvedilol in terms of renal protection (SOR A).

A 70-year-old male is being treated with medication for type 2 diabetes mellitus. Which one of the following hemoglobin A1c values is associated with the lowest mortality in this situation?

A. 5.0%–5.9%.
B. 6.0%–6.9%.
C. 7.0%–7.9%.
D. 9.0%–9.9%.

Answer: C.

In patient older than 65 years of age, treated with medication for type 2 diabetes mellitus, hemoglobin A1c values of 7%–8% have shown the greatest reduction in mortality in multiple studies. It is suggested that frequent hypoglycemia is associated with lower hemoglobin A1c values, and that presents a greater risk. Values over 9% are associated with greater mortality (SOR B). Thus, while the risk of complications increases linearly with hemoglobin A1c, mortality has a V-shaped curve.

A 50-year-old male sees you for a health maintenance visit. He has a 20-year history of smoking 1 pack of cigarettes per day but his history is otherwise unremarkable. He is not aware of any disease that runs in his family, including diabetes mellitus. He has not visited a physician for the past 5 years. A physical examination reveals a BMI of 28.2 kg/m2, normal blood pressure, and no other significant findings. Laboratory testing reveals a fasting plasma glucose level of 107 mg/dL. According to the U.S. Preventive Services Task Force, which one of the following would be most appropriate at this point?

A. No further diabetes screening unless his BMI increases to equal or more 30 kg/m2.
B. A repeat fasting plasma glucose level in 1–2 weeks.
C. A repeat fasting plasma glucose level in 1 year.
D. A repeat fasting plasma glucose level in 3 years.
E. Treatment with metformin (Glucophage).

Answer: B.

The U.S. Preventive Services Task Force (USPSTF) recommends screening for abnormal blood glucose levels as part of a cardiovascular disease risk assessment for adults who are 40–70 years of age and who are overweight (BMI 25.0–29.9 kg/m2) or obese (BMI equal or above 30.0 kg/m2). Since his fasting blood glucose result was in the range consistent with impaired fasting glucose (100–125 mg/dL), the USPSTF recommends confirming the diagnosis of the abnormal glucose level soon by performing the same test on a different day. Appropriate treatment should begin once the diagnosis is confirmed. GLP-1 agonists such as exenatide (Byetta) can be used as second-line agents to help improve glycemic control in patients with type 2 diabetes mellitus.

Regarding GLP-1, which one of the following is a CONTRAINDICATION to their use?

A. Hypothyroidism.
B. Thyroid cancer.
C. Coronary artery disease.
D. Heart failure.

Answer: B.

GLP-1 agonists are contraindicated in patients with medullary thyroid cancer or multiple endocrine neoplasm syndrome, or with a family history of these conditions. They are not associated with heart failure, coronary artery disease, or hypothyroidism. They have been associated with pancreatitis in rare cases, but this is not a contraindication to prescribing them.

A 75-year-old male is admitted to the intensive-care unit with sepsis. His past medical history is significant for diabetes mellitus and coronary artery disease. Which one of the following would be the most appropriate maximum blood glucose goal?

A. 100 mg/dL.
B. 140 mg/dL.
C. 180 mg/dL.

D. 220 mg/dL.

Answer: C.

Sepsis is a severe life-threatening disorder that has a 25%–30% mortality rate. Early aggressive management has been shown to decrease the mortality rate. The initial step in the management of sepsis is respiratory stabilization. Fluid resuscitation should be started and followed by vasopressor therapy if there is an inadequate blood pressure response. Antibiotics should be initiated within 1 hour of presentation. Other interventions in early goal-directed therapy that have been shown to improve mortality rates include blood transfusions, lowdose corticosteroid therapy, and conventional (not intensive) glycemic control with a target glucose level of <180 mg/dL. Intensive management of glucose in critically ill adult patients (a target glucose level of 80–110 mg/dL) has been shown to increase mortality.

A 72-year-old male sees you for an annual follow-up visit. He has well controlled type 2 diabetes mellitus, hypertension, and chronic kidney disease. His hemoglobin A1c is 6.2% today and his blood pressure is 122/76 mm Hg. Historically, his serum creatinine level has been rising by 0.1–0.2 mg/dL per year. Last year his creatinine level was 1.9 mg/dL (N 0.6–1.2), which translated to an estimated glomerular filtration rate (eGFR) of 39.8 mL/min/1.73 m2 (N 90–120). Which one of the following findings on this year's laboratory testing should prompt a referral to a nephrologist for management?

A. A phosphorus level of 5.0 mg/dL (N 2.5–4.5).
B. A hemoglobin level of 9.2 g/dL (N 13.5–17.5) with normal iron studies.
C. A serum creatinine level of 2.1 mg/dL (eGFR 36.0 mL/min/1.73 m2).
D. A urine microalbumin to creatinine ratio of 160 g/mg (N <30).
E. A serum vitamin D level of 10 ng/mL (N 20–100).

Answer: B.

Chronic kidney disease is defined as an estimated glomerular filtration rate (eGFR) <60 mL/min/1.73 m2 for at least 3 months, or other evidence of kidney damage such as albuminuria, abnormal imaging, or an abnormal biopsy. Current guidelines recommend referral to a nephrologist if a patient's renal disease is either of unknown etiology, is deteriorating quickly (eGFR decreasing by >5 mL/min/1.73 m2 per year), or is severe. Thresholds used to define severe chronic kidney disease include an eGFR <30 mL/min/1.73 m2, a urine albumin to creatinine ratio >300 g/mg, persistent acidosis or potassium imbalance, non–iron deficiency anemia with a hemoglobin level <10 g/dL, and evidence of secondary hyperparathyroidism. The elevated phosphorus in this patient most likely indicates metabolically significant renal disease and warrants consultation.

Which one of the following hypoglycemic medications is proven to reduce mortality rates in patients with type 2 diabetes mellitus?

A. Acarbose (Precose).
B. Glipizide (Glucotrol).
C. Metformin (Glucophage).
D. Rosiglitazone (Avandia).

Answer: C.

Metformin has been shown to reduce mortality rates in patients with type 2 diabetes mellitus (SOR A). Acarbose, an -glucosidase inhibitor, reduces the risk of cardiovascular events, including myocardial infarction, in patients with impaired glucose tolerance or type 2 diabetes mellitus (SOR B). Rosiglitazone has been shown to be associated with an increased risk of myocardial infarction and death from cardiovascular causes (SOR A). To date, there is insufficient evidence to make any conclusions about the effect of sulfonylurea insulin secretagogues such as glipizide on cardiovascular morbidity and mortality (SOR B).

A 35-year-old white male who has had type 1 diabetes mellitus for 20 years begins having episodes of hypoglycemia. His glucose levels had previously been stable and well controlled, and he has not recently changed his diet or insulin regimen. Which one of the following is the most likely cause of the hypoglycemia?

A. Spontaneous improvement of β-cell function.
B. Renal disease.
C. Reduced physical activity.
D. Insulin antibodies.

Answer: B.

The most common cause of hypoglycemia in previously stable, well-controlled diabetic patients who have not changed their diet or insulin dosage is diabetic renal disease. A reduction in physical activity or the appearance of insulin antibodies (unlikely after 20 years of therapy) would increase insulin requirements and produce hyperglycemia. Spontaneous improvement of β-cell function after 20 years would be very rare.

A 32-year-old male with type 1 diabetes mellitus presents to your office with a tender, scaly lesion on his anterior left shin. It is a 5-cm reddish-brown plaque with well-defined borders and what appears to be yellowish deposits in the center. You perform a punch biopsy of the lesion to confirm your diagnosis of

A. Granuloma annulare.
B. Necrobiosis.
C. Sarcoidosis.
D. Xanthoma.

Answer: B.

Necrobiosis lipoidica diabeticorum is seen in 0.3% of patients with diabetes mellitus or impaired glucose tolerance. The lesions may precede the diagnosis of diabetes mellitus by several years. The sharply demarcated reddish-brown plaque with central yellow deposits in the pretibial area is characteristic and a biopsy is not always necessary. Topical corticosteroids are sometimes helpful. Granuloma annulare and sarcoidosis are unlikely on the leg. Early lesions of necrobiosis lipoidica diabeticorum can be confused with granuloma annulare or sarcoidosis, however, and a biopsy may be helpful. While xanthomas can be flat plaques up to several centimeters in size, they usually occur on flexor surfaces of the limbs along with the trunk and face. They lack the reddish-brown outer portion of the lesions described here.

Which one of the following outcomes is seen with intensive glycemic control in patients with type 2 diabetes mellitus?

A. Fewer hypoglycemic events.
B. Improved blood pressure control.
C. A delay in the development of macroalbuminuria.
D. A reduced need for dialysis.
E. Lower all-cause mortality rates.

Answer: C.
Intensive glycemic control in type 2 diabetes mellitus results in a reduced rate of progression to macroalbuminuria, which is an indicator of the development of diabetic nephropathy. Intensive glycemic control does not reduce the likelihood of dialysis, nor does it improve blood pressure control. Intensive control does increase the incidence of hypoglycemic events, which is particularly hasardous in the elderly. As was demonstrated in the Action to Control Cardiovascular Risk in Diabetes (ACCORD) trial, intensive glycemic control actually increases all-cause mortality.

A 25-year-old gravida 1 para 0 presents for follow-up of gestational diabetes mellitus. She had a positive screening test at her 24-week visit last week and has been checking her blood glucose at home twice daily since that time. She is not currently on any diabetes medications and has a nutrition visit scheduled for later today. She is currently unclear on what her glucose level should be at various times throughout the day. Which one of the following is the goal fasting blood glucose in this patient?

A. ≤ 75 mg/dL.
B. ≤ 95 mg/dL.
C. ≤ 120 mg/dL.
D. ≤ 140 mg/dL.
E. ≤ 180 mg/dL.

Answer: B.
Clinicians who care for pregnant women need to be familiar with the diagnosis and monitoring parameters for gestational diabetes mellitus, as these help to determine the need for management strategies outside of diet and exercise. The goal is ≤ 95 mg/dL for fasting blood glucose, ≤140 mg/dL for 1-hour postprandial glucose, and ≤120 mg/dL for 2-hour postprandial glucose.

A 62-year-old male with type 2 diabetes mellitus, hypertension, and hypercholesterolemia is found to have a low serum vitamin B12 level. Which one of his current medications is most likely to cause this?

A. Aspirin.
B. Enalapril (Vasotec).
C. Metformin (Glucophage).
D. Simvastatin (Zocor).
E. Hydrochlorothiazide.

Answer: C.

Low vitamin B12 is seen with prolonged use of metformin, H2-blockers, and proton pump inhibitors. The mechanism is unclear, and it is not known whether prophylactic supplementation prevents deficiency. Metformin reduces absorption of vitamin B12 in 30% of patients and reduces vitamin B12 concentrations in 5%–10% of those taking it. The dosage and duration of metformin therapy is correlated with the risk of vitamin B12 deficiency. Given this risk, it seems prudent to monitor vitamin B12 levels periodically in patients taking metformin.

An 83-year-old male with moderate Alzheimer's disease and a BMI of 32.6 kg/m2 is admitted to the nursing home. He has significant osteoarthritis and has difficulty with ambulation. In recent years he has become increasingly frail and has frequently fallen in his home. He has no history of coronary artery disease or stroke, but has had type 2 diabetes mellitus for the past 15 years. Which one of the following goals would be most appropriate for managing this patient's diabetes?

A. A hemoglobin A1c of approximately 8%–9%.
B. Limiting caloric intake to 1600 kcal/day.
C. An LDL-cholesterol level <100 mg/dL.
D. A systolic blood pressure <130 mm Hg.

Answer: A.

The treatment of diabetes mellitus in frail elderly patients, especially nursing home residents, can be less stringent than with other patients. Sliding-scale insulin and diabetic diets should both be avoided in nursing home residents. Lowering LDL-cholesterol levels and aggressive blood pressure control are not indicated for frail elderly patients. The acceptable levels of hemoglobin A1c can also be liberalized, with levels of 8%–9% being acceptable.

A 45-year-old female with a BMI of 50.0 kg/m2 comes to your office to discuss treatment of her chronically elevated fasting glucose levels. Recent test results include a hemoglobin A1c of 6.0%. In the past she was not able to tolerate metformin (Glucophage) and would like to try another medication to reduce her risk of developing diabetes mellitus. Which one of the following medications would be most appropriate for this patient?

A. Acarbose (Precose).
B. Bromocriptine (Parlodel).
C. Canagliflozin (Invokana).
D. Glipizide (Glucotrol).

E. Sitagliptin (Januvia).

Answer: A.

Individuals with impaired fasting glucose or impaired glucose tolerance have a higher risk of developing diabetes mellitus in the future. Randomized, controlled trials have shown that taking metformin, glucosidase inhibitors (acarbose), orlistat, or thiazolidinediones significantly reduces the risk of developing diabetes mellitus. The U.S. Diabetes Prevention Program Outcomes Study demonstrated a 34% reduction in the development of diabetes mellitus at 10 years. In addition to medications, it is also recommended that patients be counseled about weight loss and engaging in moderate physical activity for at least 150 minutes per week. The other medications listed are indicated for the treatment of diabetes but have not been shown to be effective for prevention.

Which one of the following classes of medications for the treatment of diabetes mellitus is most likely to lead to weight loss?

A. GLP-1 receptor agonists such as exenatide (Byetta).
B. Meglitinides such as repaglinide (Prandin).
C. Sulfonylureas such as glipizide (Glucotrol).
D. Thiazolidinediones such as pioglitazone (Actos).
E. Insulin.

Answer: A.

GLP-1 receptor agonists are the most likely of these medications to lead to weight loss. They work by activating the GLP-1 receptors, which increases insulin secretion, decreases glucagon secretion, slows gastric emptying, and increases satiety. Other diabetes medications that may promote weight loss include metformin, amylin mimetics, and SGLT-2 inhibitors. The other medications listed have all been shown to cause weight gain. DPP-4 inhibitors are felt to be weight neutral.

A 45-year-old male with diabetes mellitus returns to your office for follow-up. He is on metformin (Glucophage), 1000 mg/day, as well as atorvastatin (Lipitor), 40 mg daily for hyperlipidemia. There is no diagnosis of hypertension, and his blood pressure at today’s visit is 120/70 mm Hg. Laboratory results include a hemoglobin A1c of 6.4% and an LDL-cholesterol level of 105 mg/dL. His urine albumin/creatinine ratio is in the microalbuminuric range for the first time. Which one of the following would be most appropriate at this point?

A. Renal ultrasonography.
B. A repeat urine albumin/creatinine ratio.
C. 24-hour urine for microalbumin.
D. Increasing the atorvastatin dosage.
E. Stopping metformin.

Answer: B.

This normotensive diabetic patient, appropriately screened for microalbuminuria, should have this finding confirmed on at least one of two additional spot tests, since temporary factors other than nephropathy can also result in microalbuminuria. Once a diagnosis of chronic kidney disease is confirmed, renal ultrasonography should be ordered to detect potentially reversible causes. A 24-hour urine is not necessary since the urine microalbumin/creatinine ratio correlates well with a 24-hour urine for albumin. Metformin is not contraindicated in the presence of microalbuminuria alone without a decline in the glomerular filtration rate. The patient is already on high-intensity statin therapy and there is no specific indication to increase the statin dosage based on his current LDL-cholesterol level since treatment to the target LDL-cholesterol goal has fallen out of favor.

A 31-year-old gravida 1 para 0 presents for a routine visit at 32 weeks gestation. She has gestational diabetes mellitus (GDM) and has been following the dietary guidelines from her dietitian. However, her blood glucose is still elevated and you discuss starting medications for management of her GDM. She is adamant about not starting insulin but is willing to consider taking metformin (Glucophage). Before making a decision she would like to know the specific benefits to her and her baby. You would tell her that one benefit of treatment of GDM is a decreased risk for

A. Maternal type 2 diabetes mellitus after delivery.
B. Maternal preeclampsia.
C. Perinatal death.
D. A small-for-gestational-age infant.

Answer: B.
Although there is no specific recommendation about when to initiate pharmacotherapy for the treatment of gestational diabetes mellitus (GDM), many women do require specific treatment beyond diet and exercise. Insulin has traditionally been used but oral medications are becoming increasingly common despite the lack of long-term safety data. Many outcomes for both the mother and infant are improved with pharmacologic management of GDM. These include a decreased risk for operative delivery, large-for gestational- age infants, shoulder dystocia, and maternal preeclampsia. Although a significant percentage of women with GDM subsequently develop type 2 diabetes mellitus after delivery, pharmacologic treatment of GDM has not been shown to decrease that risk. In addition, neither perinatal death nor the likelihood of small-for-gestational-age infants is significantly affected. The risk of neonatal hypoglycemia has also not consistently been shown to be affected by treatment.

Which one of the following classes of diabetes medications increases the risk of genitourinary infections by blocking glucose reabsorption by the kidneys?

A. SGLT2 inhibitors such as canagliflozin (Invokana).
B. GLP-1 receptor agonists such as exenatide (Byetta).
C. DPP-4 inhibitors such as sitagliptin (Januvia).
D. Meglitinides such as repaglinide (Prandin).
E. Glucosidase inhibitors such as acarbose (Precose).

Answer: A.

SGLT2 inhibitors inhibit SGLT2 in the proximal nephron. This blocks glucose reabsorption by the kidney, increasing glucosuria. The advantages of this medication include no hypoglycemia, decreased weight, decreased blood pressure, and effectiveness at all stages of type 2 diabetes mellitus. Disadvantages are that it increases the risk of genitourinary infections, polyuria, and volume depletion and increases LDL-cholesterol and creatinine levels. GLP-1 receptor agonists work by activating the GLP-1 receptors, causing an increase in insulin secretion, a decrease in glucagon secretion, slowing of gastric emptying, and increasing satiety. DPP-4 inhibitors inhibit DPP-4 activity, which increases postprandial active incretin concentration. This increases insulin secretion and decreases glucagon secretion. Meglitinides act by closing the ATP-sensitive K+ channels on the B-cell plasma membranes, which increases insulin secretion. Glucosidase inhibitors inhibit intestinal glucosidase, which slows intestinal carbohydrate digestion and absorption.

A 58-year-old male delivery truck driver is diagnosed with type 2 diabetes mellitus and after several months of working on lifestyle modification his hemoglobin A1c is 8.0%. You suggest it is time to start a medication to help control his condition but he is very worried about having a “low sugar reaction” that would prevent him from driving. He is on no other medications at this time. His only other health problem is long-standing controlled hypertension. His BMI is 33.1 kg/m2 and his serum creatinine level is 1.2 mg/dL (N 0.6–1.5). Which one of the following medications would be least likely to cause hypoglycemia in this patient?

A. Canagliflozin (Invokana).
B. Glimepiride (Amaryl).
C. Glipizide (Glucotrol).
D. Insulin glargine (Lantus).
E. Metformin (Glucophage).

Answer: E.

Metformin is an inexpensive oral agent for type 2 diabetes mellitus. Its mechanism of action is to increase the sensitivity of the liver and peripheral tissues to insulin. This assists the patient with weight loss efforts and, unlike insulin secretagogues, has been proven to reduce mortality with long-term use. When metformin is used as monotherapy it is not associated with episodes of hypoglycemia. For many years there has been a concern that metformin can increase the risk for lactic acidosis. This risk has been assumed to be greater in conditions that can lead to tissue hypoperfusion, such as heart failure or hypovolemia, or with renal impairment. The FDA has historically recommended against the use of metformin for any patient with even mild renal impairment (creatinine >1.4 mg/dL for women and >1.5 mg/dL for men). However, a recent meta analysis did not find supportive evidence for such restrictions. Newer evidence suggests that the use of metformin is safe even with mild to moderate renal impairment (eGFR >30 mL/min) (SOR A). However, metformin should not be initiated for patients with an eGFR <45 mL/ min/1.73 m2.

A 65-year-old male presents to an urgent care center with a foot ulcer. His past medical history is significant for hypertension, COPD, and diabetes mellitus. He has been hospitalized several times in the past year for COPD exacerbations and a hip fracture. He does not have any other current problems. On examination he has a temperature of 37.3°C (99.1°F), a pulse rate of 105 beats/min, a respiratory rate of 16/min, and a blood pressure of 142/83 mm Hg. His examination is unremarkable except for a 2-cm ulcer on the ball of his left foot that has 3 cm of surrounding erythema and some purulent drainage. His CBC is normal except for a WBC count of 14,300/mm3 (N 4300–10,800). Which one of the following would be the most appropriate choice for initial treatment?

A. Amoxicillin/clavulanate (Augmentin).
B. Linezolid (Zyvox).
C. Ciprofloxacin (Cipro).
D. Ceftriaxone (Rocephin) and levofloxacin (Levaquin).
E. Piperacillin/tazobactam (Zosyn) and vancomycin (Vancocin).

Answer: E.

This patient has a severe diabetic foot ulcer. It appears to be infected and there are signs of a systemic inflammatory response. This is an indication for intravenous antibiotics. Piperacillin tazobactam and vancomycin would be the most appropriate choice of antibiotics because together they cover the most common pathogens in diabetic foot ulcers, as well as MRSA, which is present in 10%–32% of diabetic foot ulcers. This patient has recently been hospitalized and would thus be at high risk for a MRSA infection. Moderate to severe diabetic foot ulcers are often polymicrobial and can include gram-positive cocci, gram negative bacilli, and anaerobic pathogens.

A 52-year-old male with diabetes mellitus reports that he ran out of insulin a week ago. He is drowsy but responds to your verbal commands, and the remainder of his examination is unremarkable. Laboratory Findings:

Blood glucose	625 mg/dL
Serum sodium	128 mEq/L (N 135–145)
Serum potassium	5.9 mEq/L (N 3.5–5.0)
Serum bicarbonate	12 mEq/L (N 22–26)
BUN	52 mg/dL (N 8–25)

Which one of the laboratory abnormalities is an indication that he has severe diabetic ketoacidosis?

A. Glucose.
B. Sodium.
C. Potassium.
D. Bicarbonate.
E. BUN.

Answer: D.

The diagnosis of diabetic ketoacidosis (DKA) is based on an elevated serum glucose level (>250 mg/dL), an elevated serum ketone level, a pH <7.3, and a serum bicarbonate level <18 mEq/L. The severity of DKA is determined by the arterial pH, bicarbonate level, anion gap, and mental status of the patient. Elevation of BUN and serum creatinine levels reflects intravascular volume loss. The measured serum sodium is reduced as a result of the hyperglycemia, as serum sodium is reduced by 1.6 mEq/L for each 100 mg/dL rise in serum glucose. The degree of hyperglycemia does not necessarily correlate closely with the degree of DKA since a variety of factors determine the level of hyperglycemia, such as oral intake and urinary glucose loss (SOR C).

Which one of the following tests is recommended for the detection and diagnosis of gestational diabetes mellitus?

A. Hemoglobin A1c.
B. Fasting blood glucose.
C. 2-hour postprandial glucose.
D. An oral glucose tolerance test.
E. A fasting insulin/glucagon ratio.

Answer: D.

A 49-year-old unemployed African-American male has multiple chronic conditions, including type 2 diabetes mellitus, chronic kidney disease, hypertension, obstructive sleep apnea, and lower extremity edema. He is on several medications, which he reports taking sporadically due to a lack of health insurance and a limited income. He has several abnormal laboratory values, including a serum creatinine level of 3.1 mg/dL, an increase from his usual levels, which have ranged from 1.2–1.6 mg/dL over the past 5 years. You calculate his glomerular filtration rate to be 27 mL/min/1.73 m2. Which one of the following medications that he takes should be stopped at this time?

A. Amlodipine (Norvasc).
B. Aspirin.
C. Insulin.
D. Metformin (Glucophage).
E. Metoprolol (Lopressor, Toprol-XL).

Answer: D.

The National Kidney Foundation defines chronic kidney disease (CKD) as a glomerular filtration rate (GFR) <60 mL/min/1.73 m2, or evidence of kidney damage with or without a decreased GFR, for 3 or more months (SOR C). Individuals with CKD are at increased risk for serious cardiovascular disease events, especially if they have other comorbid conditions such as hypertension or diabetes mellitus. It is important to have a multifactorial strategy for this patient that includes controlling his blood glucose and blood pressure in addition to continuing his antiplatelet therapy (SOR A). Metformin is contraindicated in patients with an eGFR<30 mL/min/1.73 m2.

A 32-year-old male presents with a 1-year history of increasing fatigue, polyuria, and a gradual 30-lb weight loss. Serum chemistries reveal a bicarbonate level of 23 mEq/L (N 22–28), a corrected anion gap of 8 mEq/L (N 3–11), and a glucose level of 658 mg/dL (N 60–110). The patient is admitted to the hospital and his serum glucose drops to 174 mg/dL after he is given 2 L of intravenous normal saline and 10 units of regular insulin subcutaneously. He is observed overnight and further laboratory testing is done the next morning. Which one of the following is more consistent with type 2 diabetes mellitus than with type 1 diabetes mellitus?

A. The patient’s history of weight loss.

B. The patient’s response to the initial dose of insulin.
C. The time course of symptom onset.
D. Morning laboratory studies showing a C-peptide level of <1.1 ng/mL (N 1.1–4.4).

ANSWER: C.
This patient presents with marked hyperglycemia but no evidence of ketoacidosis or nonketotic coma. Differentiating between type 1 and type 2 diabetes mellitus is important for guiding therapy. The gradual onset of symptoms is more consistent with type 2 diabetes mellitus, whereas type 1 diabetes typically has a more rapid onset. Patients with type 1 diabetes typically need lower doses of insulin to correct hyperglycemia, as they lack the insulin insensitivity that is the hallmark of type 2 diabetes. Positive anti- GAD antibodies and low Cpeptide at the time of the initial diagnosis are also consistent with type 1 diabetes, although C-peptide levels can also be low in long-standing type 2 diabetes. Weight loss occurs in both types of diabetes mellitus when glucose is profoundly elevated.

An 86-year-old female nursing-home resident has type 2 diabetes mellitus, chronic diastolic heart failure, chronic kidney disease, advanced osteoarthritis, hypertension, Alzheimer’s disease, and other comorbidities. She requires assistance with dressing, bathing, and feeding. For this patient, the American Geriatrics Society recommends a hemoglobin A1c goal of

A. <7.0%.
B. <8.0%.
C. <8.5%.
D. <9.0%.
E. <9.5%.

Answer: C.
The American Geriatrics Society consensus report for considering treatment goals for glycemia recommends a hemoglobin A1c goal of <8.5% for individuals with very complex health problems or poor health. This includes individuals in long-term care and those with end-stage chronic illnesses, moderate to severe cognitive impairment, or more than two activity of daily living (ADL) dependencies. A hemoglobin A1c <8.5% equates to an estimated average glucose level of approximately 200 mg/dL. Looser glycemic targets than this may expose patients to acute risks from glycosuria, dehydration, hyperglycemic hyperosmolar syndrome, and poor wound healing.

A 48-year-old female sees you for routine follow-up. She was diagnosed with type 2 diabetes mellitus 2 years ago and has been treated with metformin (Glucophage), 850 mg orally 3 times daily, and glipizide (Glucotrol XL), 20 mg orally daily, along with diet and exercise. Her other medical problems include hypertension and obesity. She has no known cardiovascular disease or microvascular complications. She came in for laboratory testing yesterday, and her hemoglobin A1c is 8.0% (N <5.7%). Which one of the following medications would help with both glycemic control and weight loss for this patient?

A. Exenatide (Byetta).

B. Pioglitazone (Actos).
C. Sitagliptin (Januvia).
D. Insulin.

Answer: A.

Given the information about this patient, such as her relatively recent diagnosis, her age, and her lack of macroor microvascular complications, a more strict hemoglobin A1c goal is indicated. There are several oral and injectable medicines that are reasonable choices in this case. Exenatide is an injectable GLP-1 agonist that is associated with weight loss. Pioglitazone is also effective but is associated with fluid retention rather than weight loss. Sitagliptin is a dipeptidyl peptidase IV (DPP-IV) inhibitor that may be a reasonable option in this case, but is not associated with weight loss. Insulin, either basal only, mixed, or basal-bolus regimens, may also be the best option for the patient described, but it does cause weight gain. Cost is another major consideration in treatment decisions, but more information would be needed to address this issue.

A 62-year-old female with type 2 diabetes mellitus routinely has fasting blood glucose levels in the 80–100 mg/dL range and her hemoglobin A1c level is 7.8%. She has been diligently monitoring her blood glucose levels and all are acceptable with the exception of elevated bedtime readings. She currently is on insulin glargine (Lantus), 18 U at night. Which one of the following changes would be most appropriate for this patient?

A. Adding rapid-acting insulin at breakfast.
B. Adding rapid-acting insulin at lunch.
C. Adding rapid-acting insulin at dinner.
D. Increasing the nightly insulin glargine dose.
E. Increasing the insulin glargine dosage and giving two-thirds in the morning and one-third at night.

Answer: C.

This patient continues to have an elevated hemoglobin A1c and bedtime hyperglycemia. The addition of a rapidacting insulin at dinner would be the next step in management. For patients exhibiting blood glucose elevations before dinner, the addition of rapid-acting insulin at lunch is preferred. For patients with elevations before lunch, rapid-acting insulin with breakfast would most likely improve glucose control. Increasing or splitting the insulin glargine would be unlikely to improve management.

According to the American Diabetes Association, screening should be considered for which one of the following conditions in children with type 1 diabetes mellitus?

A. Hypothyroidism.
B. Cystic fibrosis.
C. Cushing syndrome.
D. Systemic lupus erythematosus.
E. Pancreatic pseudocysts.

Answer: A.

Children with diabetes mellitus are at increased risk for retinopathy, nephropathy, and hypertension. They are also more likely to have immune-mediated disorders such as celiac disease and hypothyroidism. For all children and adolescents with type 1 diabetes mellitus, the American Diabetes Association recommends screening for hypothyroidism, nephropathy, hypertension, celiac disease, and retinopathy. Screening for dyslipidemia should be considered if there is a family history of hypercholesterolemia or cardiac events before age 55.

A 34-year-old white female presents with complaints of polydipsia, polyuria, and fatigue. Her family history is positive for diabetes mellitus. On examination she has a BMI of 38 kg/m2. Her fasting blood glucose level is 152 mg/dL and her hemoglobin A1c is 8.5%. Her fasting blood glucose level was 89 mg/dL 6 months ago. She says her vision has been somewhat blurry lately, but she has not noticed any tingling in her feet. Which one of the following initial management options would be most appropriate?

A. Lifestyle modification.
B. Pioglitazone (Actos).
C. Sitagliptin (Januvia).
D. Insulin.
E. Bariatric surgery.

Answer: A.

The most cost-effective intervention for type 2 diabetes mellitus is lifestyle modification. The difficulty with this intervention, however, lies in keeping the patient motivated. Metformin is also cost-effective. Bariatric surgery shows immediate benefits in lowering glucose levels in patients who have undergone this treatment. Unfortunately, studies on its long-term effects are lacking. Sitagliptin, pioglitazone, and insulin are effective secondary agents but are expensive and not as cost-effective as metformin or dietary changes and exercise.

A 70-year-old retired minister presents with fatigue. Two weeks ago he returned from a mission trip to Mexico and had a 4-day episode of watery diarrhea, which resolved with bismuth subsalicylate (Pepto-Bismol) treatment. He has a 5-year history of diabetes mellitus and hypertension. Six months ago a myocardial infarction was treated successfully with a drug-eluting stent. His blood pressure is 138/80 mm Hg, pulse rate 86 beats/min, respiratory rate 18/min, and temperature 36.9°C (98.4°F). The remainder of the physical examination is unremarkable.

Laboratory Findings
Hemoglobin--14.2 g/dL (N 13.0–18.0)
WBCs--8000/mm3 (N 4300–10,800)
BUN--20 mg/dL (N 8–25)
Creatinine--1.9 mg/dL (N 0.6–1.5)
Potassium--3.9 mEq/L (N 3.4–4.8)
Glucose---140 mg/dL
AST (SGOT) --30 U/L (N 10–55)
Creatine kinase-----------------------------------40 U/L (N 60–400)
Which one of this patient’s medications should be stopped?

A. Carvedilol (Coreg).
B. Clopidogrel (Plavix).
C. Metformin (Glucophage).
D. Simvastatin (Zocor).
E. Sitagliptin (Januvia).

Answer: C.

Metformin is contraindicated in males with creatinine levels >1.5 mg/dL (SOR C) and should be stopped in this patient. The recent episode of diarrhea may have exacerbated renal disease associated with longstanding hypertension and diabetes mellitus. Dose modifications for sitagliptin and simvastatin may be needed with renal dysfunction, but these medications would not have to be stopped. Carvedilol and Clopidogrel do not require a change in dosage with renal dysfunction because their metabolism is largely hepatic.

A 69-year-old male with type 2 diabetes mellitus comes to your office for a routine follow-up visit. He takes insulin glargine (Lantus) as a basal insulin, with meal-time boluses of insulin lispro (Humalog). He reports repeated episodes of hypoglycemia with blood glucose levels in the 40–50 mg/dL range. He treats them appropriately by consuming about 15 g of carbohydrates. He has a history of severe episodes of hypoglycemia requiring emergency services. In addition to insulin, his current medications include simvastatin (Zocor), lisinopril (Prinivil, Zestril), and aspirin. He has both diabetic autonomic neuropathy and retinopathy. Which one of the following factors in this patient’s case is the most significant predictor of severe hypoglycemia?

A. His age.
B. His sex.
C. His medications.
D. His previous episodes of severe hypoglycemia.
E. His diabetic autonomic neuropathy.

Answer: D.

In patients with type 2 diabetes mellitus, the single most important predictor of severe hypoglycemia is a previous history of severe hypoglycemia that required external assistance. It is thought that hypoglycemia reduces the body’s protective responses (glucagon and epinephrine) to subsequent episodes of hypoglycemia (SOR C). Increased blood glucose level goals and increased self monitoring of blood glucose are the most important measures for avoiding further episodes. Less significant risk factors for hypoglycemia include advanced age, use of five or more medications, African-American ethnicity, and recent hospital discharge (SOR B). Diabetic autonomic neuropathy may be a risk factor but this has not been definitively established.

According to the American Diabetes Association, screening for diabetes mellitus in the asymptomatic patient with no risk factors should begin at which age?

A. 25 years.
B. 30 years.
C. 35 years.

D. 40 years.
E. 45 years.

Answer: C.

Testing for diabetes mellitus should be considered in all asymptomatic adults who have a BMI ≥25 kg/m2 and have one or more additional risk factors such as physical inactivity, a first degree relative with diabetes, a highrisk ethnicity, hypertension, hyperlipidemia, or polycystic ovary syndrome. In asymptomatic patients with no risk factors, screening should begin at age 35.

A 58-year-old male has a history of type 2 diabetes mellitus that is not well controlled. He has recently developed mild hypertension that has not been controlled by lifestyle changes. You prescribe lisinopril (Prinivil, Zestril), 20 mg daily, for the hypertension and 2 months later you note that his serum creatinine level has increased from 1.25 mg/dL to 1.5 mg/dL (N 0.64–1.27) and his blood pressure has decreased from 142/88 mm Hg to 128/78 mm Hg. Which one of the following should you do now?

A. Continue the current dosage of lisinopril.
B. Decrease the dosage of lisinopril to 10 mg.
C. Increase the dosage of lisinopril to 40 mg.
D. Discontinue lisinopril and initiate chlorthalidone.
E. Discontinue lisinopril and initiate losartan (Cozaar).

Answer: A.

ACE inhibitors such as lisinopril do not need to be discontinued unless baseline creatinine increases by >30%. (This patient's creatinine increased by 20%.) The current dosage of lisinopril is appropriate, as the blood pressure meets the diabetic goal of <130/80 mm Hg. Small increases in creatinine have been associated with long-term preservation of renal function, and may be a marker of changes in intraglomerular pressure.

Which one of the following is most likely to cause hypoglycemia when used as monotherapy?

A. Acarbose (Precose).
B. Exenatide (Byetta).
C. Pioglitazone (Actos).
D. Repaglinide (Prandin).
E. Sitagliptin (Januvia).

Answer: D.

Repaglinide is a non-sulfonylurea agent that interacts with a different portion of the sulfonylurea receptor to stimulate insulin secretion. It has a relatively short duration of action, and while it may cause hypoglycemia this is less likely than with a sulfonylurea agent. Pioglitazone reduces insulin resistance and has no hypoglycemic effect. Acarbose delays absorption of carbohydrates such as starch, sucrose, and maltose, but does not affect the absorption of glucose and other monosaccharides. Sitagliptin inhibits the enzyme responsible for the breakdown of the naturally occurring incretins, and its major advantage is the absence of side effects. Exenatide stimulates insulin secretion in a glucose-dependent fashion, inhibits glucagon secretion, slows gastric emptying, and may have a central satiety effect. It does not cause hypoglycemia when used as monotherapy, but may increase the risk when used with an insulin secretagogue such as glyburide or glipizide.

A 45-year-old female with type 1 diabetes mellitus currently takes NPH insulin (Humulin, Novolin) twice a day. She expresses a desire to change to insulin glargine (Lantus). Her diabetes has always been well controlled, and her current hemoglobin A1c of 7.4% is typical for her. Which one of the following is most likely to be reduced if this change is made?

A. Quality of life.
B. Hemoglobin A1c.
C. Morbidity from all causes.
D. Treatment costs.
E. Her risk for hypoglycemia.

Answer: E.
The extended flat pharmacokinetic curve of long-acting insulin analogues makes once-daily administration of larger doses of insulin possible. Such treatment should, in theory, provide increased flexibility with regard to the timing of injections and improve compliance. This should improve control of the patient's diabetes, reduce the risk of hypoglycemia, and improve overall patient satisfaction. To date, however, the only proven benefit of treatment with insulin analogues is a reduction in the low rate of symptomatic, nocturnal, and overt hypoglycemia experienced by patients treated with isophane insulin. Although the total cost of treatment with insulin analogues is higher, a Cochrane review of the limited number of studies comparing insulin treatments showed no statistically significant differences in the hemoglobin A1c levels measured at the end of the studies in any treatment group (SOR C). Significant changes in morbidity, mortality, or quality of life have not been demonstrated (SOR C).

A 49-year-old female with type 1 diabetes mellitus presents to your office with a 1-week history of a red, hot, swollen foot. She recalls twisting her ankle when stepping off a curb the day before the swelling began. She denies fever or significant pain. She has difficulty walking due to stiffness in the foot. On examination you find the patient is in no distress. Her temperature is 36.7°C (98.1°F), blood pressure 144/82 mm Hg, and heart rate 80 beats/min. Her right foot is edematous, erythematous, and excessively warm. Monofilament testing reveals significant impairment of sensation of both feet. She has restricted range of motion of the right ankle and foot compared to the left. No skin lesions are present. Dorsalis pedis pulses are brisk and symmetric. A radiograph of the right foot is normal. Laboratory Findings
Hemoglobin A1c_ 8.2%
Capillary blood glucose__ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ 213 mg/dL
Hematocrit_ 37.2% (N 36.0–46.0)
WBCs__ 11,000/mm3 (N 4300–10,800)
Platelets_ 350,000/mm3 (N 150,000–350,000)
Erythrocyte sedimentation rate_ _ _ _ _ _ _ _ _ _ _ _ _ 30 mm/hr (N 1–25)
Which one of the following is the most likely diagnosis?

A. Osteomyelitis.
B. Osteoarthritis.
C. Acute gout.
D. Charcot foot.

Answer: D.

This patient most likely has Charcot foot (neuropathic arthropathy). This is an uncommon condition, most often found in patients with at least a 10-year history of type 1 or 2 diabetes. Patients have peripheral neuropathy and typically present with painless swelling of a foot. About 50% of patients can recall minor trauma preceding the onset of symptoms. Early radiologic findings may be normal, but as the condition progresses plain films may reveal bony fractures, fragmentation, and bone destruction. On examination the foot is either stiff or hypermobile, warm, erythematous, and edematous. Crepitus can be felt in later stages of the disease. Laboratory results can be normal or show increases in the WBC count. Any patient with long-standing diabetes mellitus and a warm, red, swollen foot should be presumed to have Charcot foot and have the foot immobilized immediately to protect it from stress and to prevent further destruction and disability (SOR C). The differential diagnosis of Charcot foot includes osteomyelitis, which can be difficult to distinguish. Patients with osteomyelitis can have skin ulcers that may be probed to the bone. They will often be febrile, with higher erythrocyte sedimentation rates and WBC counts than patients with Charcot foot. Aspiration of the joint fluid is helpful in distinguishing between the two conditions. Aspiration can also help distinguish between acute gout and Charcot foot. Patients may have pain and stiffness in their foot with either condition. Patients with gout may have an elevated uric acid level, and plain films may reveal tophi. Patients with osteoarthritis are unlikely to have warm, erythematous skin overlying the involved joint. Symptoms often have an insidious onset rather than the more acute onset of Charcot foot.

A 45-year-old male with type 1 diabetes mellitus receives a corticosteroid injection for osteoarthritis of the left knee. Which one of the following is true regarding monitoring of his blood glucose levels?

A. Glucose levels should be closely monitored for 48 hours.
B. Glucose levels should be closely monitored for 7 days.
C. Glucose levels should be closely monitored for 14 days.
D. No additional monitoring is necessary.

Answer: D.

A single intra-articular injection has little or no effect on glycemic control (SOR A). Soft-tissue or peritendinous injections can affect blood glucose levels for 5–21 days, however, and diabetic patients should closely monitor blood glucose levels for 2 weeks following these injections.

According to the most recent American Diabetes Association guidelines, which one of the following groups of patients with diabetes mellitus should take aspirin for primary prevention of cardiovascular events?

A. All patients.
B. Patients over the age of 50 with diabetes and hypertension.

Answer: B.

ADA Recommendations for using aspirin as primary prevention include both men and women aged ≥50 years with diabetes and at least one additional major risk factor (family history of premature ASCVD, hypertension, dyslipidemia, smoking, or chronic kidney disease/albuminuria) who are not at increased risk of bleeding (e.g., older age, anemia, renal disease).

A 57-year-old male with a BMI of 37.1 kg/m2 was found to have a fasting blood glucose level of 115 mg/dL on a screening test. His mother and three siblings have type 2 diabetes mellitus. A follow-up hemoglobin A1c (HbA1c) level is 6.2%. Six months later, after lifestyle interventions, the patient's BMI is 35.5 kg/m2 and his HbA1c is 6.1%. On a lipid panel, his triglyceride level is 457 mg/dL and his HDL-cholesterol level is 32 mg/dL. His serum creatinine level is 1.0 mg/dL (N 0.6–1.2). You consider the use of pharmacologic therapy. Which one of the following would be the best initial medication?

A. Acarbose (Precose).
B. Exenatide (Byetta).
C. Glipizide (Glucotrol).
D. Metformin (Glucophage).
E. Pioglitazone (Actos).

Answer: D.

Metformin is well tolerated and there is good data to show it helps prevent type 2 diabetes mellitus in high-risk patients. Pioglitazone has been shown to slow the progression from prediabetes to diabetes, but it has more side effects and is more expensive than metformin. Neither glipizide nor exenatide is currently recommended as a treatment for prediabetes. Acarbose has a high discontinuation rate due to side effects.
You are considering adding sitagliptin (Januvia) to the regimen of a patient with type 2 diabetes mellitus.

Which one of the following best describes the mechanism of action of Sitag;iptin?

A. It increases glucagon levels.
B. It slows inactivation of incretin hormones.
C. It reduces the absorption of glucose in the gastrointestinal tract.
D. It reduces insulin resistance in skeletal muscle.
E. It reduces insulin resistance in the liver.

Answer: B.

Sitagliptin is a DPP-4 inhibitor. These agents slow the inactivation of incretin hormones, prolonging their action and thereby increasing insulin release and decreasing glucagon. Sitagliptin decreases hemoglobin A1c levels by 0.7%, but there is no data on patient-oriented outcomes or long-term safety with this medication.

A 68-year-old male with type 2 diabetes mellitus has failed to control his diabetes with diet and exercise. His most recent serum creatinine level was 1.9 mg/dL (N 0.6–1.5). Which one of the following agents is most likely to cause symptomatic hypoglycemia in this patient?

A. Glimepiride (Amaryl).
B. Glipizide (Glucotrol).
C. Glyburide (DiaBeta).
D. Metformin (Glucophage).
E. Repaglinide (Prandin).

Answer: C.
Older patients are at higher risk for hypoglycemia caused by oral antidiabetic agents. Glyburide is associated with a significantly greater risk of symptomatic hypoglycemia than other second-generation hypoglycemic agents. Metformin decreases liver production of glucose and is not associated with hypoglycemia. Even so, this patient's creatinine elevation is a contraindication to metformin use, as it increases the risk of lactic acidosis. Glimepiride, glipizide, and repaglinide stimulate insulin release and increase the risk of hypoglycemia. However, the risk of symptomatic hypoglycemia is substantially lower compared to the risk associated with glyburide in patients with similar hemoglobin A1c values (SOR B).

Which one of the following findings on examination of the head, oral cavity, and neck is associated with diabetes mellitus?

A. Parotid enlargement.
B. Tooth erosion.
C. Diffuse melanin pigmentation.
D. Cobblestone oral mucosa.
E. Painful oral ulcers.

Answer: A.
Sialadenosis, bilateral noninflammatory enlargement of the parotid gland, is associated with diabetes mellitus. Periodontal bleeding and inflammation, candidiasis, and delayed wound healing also are associated with diabetes mellitus. Tooth erosion can be an oral manifestation of gastroesophageal reflux disease or bulimia. Cobblestone oral mucosa is seen in Crohn's disease. Diffuse melanin pigmentation is an oral finding of Addison's disease. Painful oral ulcers occur in several conditions, including Behcet syndrome, aphthous ulcers, pemphigus, and pemphigoid.

Which one of the following is true concerning the use of hemoglobin A1c levels to diagnose diabetes mellitus?

A. A level >6.0% is diagnostic of diabetes mellitus.
B. Results can be misleading in patients with sickle cell disease.
C. The test is equally sensitive in African-Americans and whites.

D. The test is useful to diagnose diabetes during pregnancy.

Answer: B.

Hemoglobin A1c (HbA1c) levels of 6.0%–6.5% indicate an increased risk for diabetes mellitus, and levels >6.5% can be used to diagnose diabetes. Hemoglobinopathies and conditions causing hemolysis can cause HbA1c measurements to be falsely low. The opposite effect is seen in African Americans, who have higher HbA1c levels than whites along the continuum of glycemia. Other tests should be used in patients with conditions that affect HbA1c, including pregnancy.

A 56-year-old male with type 2 diabetes mellitus has normal cardiac and renal function but has failed to achieve adequate control of his diabetes with diet and multiple oral agents. His BMI is 30.1 kg/m2 and his hemoglobin A1c level is 9.1%. Which one of the following is most likely to be beneficial in combination with insulin and diet therapy in this patient?

A. Acarbose (Precose).
B. Glimepiride (Amaryl).
C. Metformin (Glucophage).
D. Pioglitazone (Actos).
E. Repaglinide (Prandin).

Answer: C.

Metformin has been found to reduce cardiovascular risk in patients with type 2 diabetes mellitus. It also decreases the risk of weight gain, and unlike some oral agents it does not significantly increase the risk of hypoglycemia. It should be continued when insulin is initiated in patients with no renal impairment.

Which one of the following, when confirmed with a repeat test, meets the diagnostic criteria for diabetes mellitus?

A. A fasting blood glucose level of 120 mg/dL.
B. A 2-hour value of 180 mg/dL on an oral glucose tolerance test.
C. A random glucose level of 180 mg/dL in a patient with symptoms of diabetes mellitus.
D. A positive urine dipstick for glucose.
E. A hemoglobin A1c of 7.0%.

Answer: E.

An international expert committee issued a report in 2009 recommending that a hemoglobin A1c level more than or equal to 6.5% be used to diagnose diabetes mellitus. Other criteria include a fasting plasma glucose level more than or equal to 126 mg/dL, a random glucose level more than or equal to 200 mg/dL in a patient with symptoms of diabetes, or a 2-hour oral glucose tolerance test value more than or equal to 200 mg/dL. While a urine dipstick may be used to screen for diabetes, it is not a diagnostic test.

A 26-year-old gravida 3 para 2 was diagnosed with gestational diabetes mellitus at 24 weeks gestation. She was prescribed appropriate nutritional therapy and an exercise program. After 4 weeks, her fasting plasma glucose levels remain in the range of 105–110 mg/dL. Which one of the following would be the most appropriate treatment for this patient at this time?

A. Continuation of the current regimen.
B. Long-acting insulin glargine (Lantus) once daily.
C. Pioglitazone (Actos) once daily.
D. A combination of intermediate-acting insulin (e.g., NPH) and a short-acting insulin (e.g., lispro) twice daily.
E. Sliding-scale insulin 4 times daily using ultra-short-acting insulin.

Answer: D.

In addition to an appropriate diet and exercise regimen, pharmacologic therapy should be initiated in pregnant women with gestational diabetes mellitus whose fasting plasma glucose levels remain above 100 mg/dL despite diet and exercise. There is strong evidence that such treatment to maintain fasting plasma glucose levels below 95 mg/dL and 1-hour postprandial levels below 140 mg/dL results in improved fetal well-being and neonatal outcomes. While oral therapy with metformin or glyburide is considered safe and possibly effective, insulin therapy is the best option for the pharmacologic treatment of gestational diabetes. Thiazolidinediones such as pioglitazone have not been shown to be effective or safe in pregnancy. The use of long-acting basal insulin analogues, such as glargine and detemir, has not been sufficiently evaluated in pregnancy. Sliding-scale coverage with ultra-short-acting insulin or insulin analogues, such as lispro and aspart, is generally not required in most women with gestational diabetes. While it may be effective, it involves four daily glucose checks and injections. Most patients are successfully treated with a twice-daily combination of an intermediate-acting insulin and a short-acting insulin while continuing a diet and exercise program.

Which one of the following insulin regimens most closely mimics the normal pattern of pancreatic insulin release in a nondiabetic person?

A. 70/30 NPH/regular insulin (Humulin 70/30) twice daily.
B. NPH insulin twice daily plus an insulin sliding-scale protocol using regular insulin.
C. Insulin glargine (Lantus) daily plus an insulin sliding-scale protocol using regular insulin.
D. Insulin detemir (Levamir) daily plus rapid-acting insulin with meals.
E. Rapid-acting insulin before each meal.

Answer: D.

The body produces insulin at a basal rate and additional insulin with food intake. The combination of a basal insulin, such as glargine or detemir, plus a rapid-acting insulin at mealtimes is the regimen that most closely resembles the body's normal response. Basal insulin provides a relatively constant level of insulin for 24 hours, with an onset of action in 1 hour and no peak. NPH gives approximately 12 hours of coverage with a peak around 6–8 hours. Regular insulin has an onset of action of about 30 minutes and lasts about 5–8 hours, with a peak at about 2–4 hours. New rapid-acting analogue insulins have an onset of action within 5–15 minutes, peak within

30–75 minutes, and last only about 2–3 hours after administration. Thus, a 70/30 insulin mix (typically 70% NPH and 30% regular) provides coverage for 12 hours, but the peaks of insulin release do not closely mimic natural patterns. NPH given twice daily along with an insulin sliding scale protocol using regular insulin is only slightly closer than a 70/30 twice-daily regimen. Rapid insulin alone does not provide any basal insulin, and the patient would therefore not have insulin available during the night.

Which one of the following classes of diabetes medications acts primarily by stimulating pancreatic insulin secretion?

A. Biguanides, such as metformin (Glucophage).
B. Thiazolidinediones, such as pioglitazone (Actos).
C. DPP-4 inhibitors, such as sitagliptin (Januvia).
D. Sulfonylureas, such as glipizide (Glucotrol).
E. Amylin analogs, such as pramlintide (Symlin).

Answer: D.
Biguanides and thiazolidinediones are insulin sensitizers that decrease hepatic glucose production and increase insulin sensitivity. Sulfonylureas and meglitinides stimulate pancreatic insulin secretion, while DPP-4 inhibitors prevent GLP-1 breakdown and slow the breakdown of some sugars. GLP-1 mimetics stimulate insulin secretion, suppress glucagon secretion, and promote cell production. Amylin analogs act with insulin to delay gastric emptying and they also inhibit glucagon release.

Which one of the following is the most common secondary cause of nephrotic syndrome in adults?

A. Diabetes mellitus.
B. Systemic lupus erythematosus.
C. Hepatitis C.
D. NSAIDs.
E. Multiple myeloma.

Answer: A.
Although most cases of nephrotic syndrome are caused by primary kidney disease, the most common secondary cause of nephrotic syndrome in adults is diabetes mellitus. Other secondary causes include systemic lupus erythematosus, hepatitis B, hepatitis C, NSAIDs, amyloidosis, multiple myeloma, HIV, and preeclampsia. Primary causes include membranous nephropathy and focal segmental glomerulosclerosis, each accounting for approximately one third of cases.

An 81-year-old male with type 2 diabetes mellitus has a hemoglobin A of 10.9%. He is already on the maximum dosage of glipizide (Glucotrol). His other medical problems include mild renal insufficiency and moderate ischemic cardiomyopathy. Which one of the following would be the most appropriate change in this patient's diabetes regimen?

A. Add metformin (Glucophage).
B. Add sitagliptin (Januvia).
C. Add pioglitazone (Actos).
D. Initiate insulin therapy.

Answer: D.
This geriatric diabetic patient should be treated with insulin. Metformin is contraindicated in patients with renal insufficiency. Sitagliptin should not be added to a sulfonylurea drug initially, the dosage should be lowered in patients with renal insufficiency, and given alone it would probably not result in reasonable diabetic control. Pioglitazone can cause fluid retention and therefore would not be a good choice for a patient with cardiomyopathy.

Which one of the following treatments for diabetes mellitus reduces insulin resistance?

A. Acarbose (Precose).
B. Sitagliptin (Januvia).
C. Repaglinide (Prandin).
D. Exenatide (Byetta).
E. Pioglitazone (Actos).

Answer: E.
Repaglinide and nateglinide are nonsulfonylureas that act on a portion of the sulfonylurea receptor to stimulate insulin secretion. Pioglitazone is a thiazolidinedione, which reduces insulin resistance. It is believed that the mechanism for this is activation of PPAR-Y, a receptor that affects several insulin-responsive genes. Acarbose is a competitive inhibitor of #-glucosidases, enzymes that break down complex carbohydrates into monosaccharides. This delays the absorption of carbohydrates such as starch, sucrose, and maltose, but does not affect the absorption of glucose. Sitagliptin is a DPP-IV inhibitor, and this class of drugs inhibits the enzyme responsible for the breakdown of the incretins GLP-1 and GIP. Exenatide is an incretin mimetic that stimulates insulin secretion in a glucose-dependent fashion, slows gastric emptying, and may promote satiety.

A 45-year-old male has diabetes mellitus and hypertension. He has no other medical problems. Which one of the following classes of medications is the preferred first-line therapy for the treatment of hypertension in this patient?

A. Potassium-sparing diuretics.
B. ACE inhibitors.
C. Alpha-Receptor blockers.
D. Calcium channel blockers.
E. Beta-Blockers.

Answer: B.

The target blood pressure in patients with diabetes mellitus is <130/80 mm Hg (SOR A). ACE inhibitors and angiotensin receptor blockers (ARBs) are the preferred first-line agents for the management of patients with hypertension and diabetes mellitus (SOR A). If the target blood pressure is not achieved with an ACE inhibitor or ARB, the addition of a thiazide diuretic is the preferred second-line therapy for most patients; potassiumsparing and loop diuretics are not recommended (SOR B). β-Blockers are recommended for patients with diabetes mellitus who also have a history of myocardial infarction, heart failure, coronary artery disease, or stable angina (SOR A). Calcium channel blockers should be reserved for patients with diabetes mellitus who cannot tolerate preferred antihypertensive agents, or for those who need additional agents to achieve their target blood pressure (SOR A).

A 66-year-old male with type 2 diabetes mellitus is seen for a follow-up visit and has a hemoglobin A1c of 6.7%. He is currently taking metformin (Glucophage), 1000 mg twice daily. He has no history of coronary artery disease or heart failure. Which one of the following would be most appropriate?

A. Continuing his current regimen.
B. Increasing the metformin dosage.
C. Adding a sulfonylurea.
D. Adding a thiazolidinedione.
E. Adding daily long-acting insulin.

Answer: A.

According to the American Diabetes Association, the goal for patients with type 2 diabetes mellitus is to achieve a hemoglobin A 1c of <7.0% (SOR C). This patient has achieved this goal, and there is no indication for changes in his management.

Which one of the following treatments for type 2 diabetes mellitus often produces significant weight loss?

A. Exenatide (Byetta).
B. Glipizide (Glucotrol).
C. Pioglitazone (Actos).
D. Insulin detemir (Levemir).
E. Insulin lispro (Humalog).

Answer: A.

Of the many currently available medications to treat diabetes mellitus, only metformin and incretin mimetics such as exenatide have the additional benefit of helping the overweight or obese patient lose a significant amount of weight. Most of the other medications, including all the insulin formulations, unfortunately lead to weight gain or have no effect on weight.

A 52-year-old Hispanic female with diabetes mellitus and stage 3 chronic kidney disease sees you for follow-up after tests show an estimated glomerular filtration rate of 56 mL/min. Which one of the following medications should she avoid to prevent further deterioration in renal function?

A. Lisinopril (Prinivil, Zestril).
B. Folic acid.
C. Low-dose aspirin.
D. Candesartan (Atacand).
E. Ibuprofen.

Answer: E.

Patients with chronic kidney disease (CKD) and those at risk for CKD because of conditions such as hypertension and diabetes have an increased risk of deterioration in renal function from NSAID use. NSAIDs induce renal injury by acutely reducing renal blood flow and, in some patients, by causing interstitial nephritis. Because many of these drugs are available over the counter, patients often assume they are safe for anyone. Physicians should counsel all patients with CKD, as well as those at increased risk for CKD, to avoid NSAIDs. ACE inhibitors and angiotensin II receptor blockers are renoprotective and their use is recommended in all diabetics. The use of low-dose aspirin and folic acid is recommended in all patients with diabetes, due to the vasculoprotective properties of these drugs. High-dose aspirin should be avoided because it acts as an NSAID.

A 46-year-old female presents to your office with a 2-week history of pain in her left shoulder. She does not recall any injury, and the pain is present when she is resting and at night. Her only chronic medical problem is type 2 diabetes mellitus. On examination, she has limited movement of the shoulder and almost complete loss of external rotation. Radiographs of the shoulder are normal, as is her erythrocyte sedimentation rate. Which one of the following is the most likely diagnosis?

A. Frozen shoulder.
B. Torn rotator cuff.
C. Impingement syndrome.
D. Chronic posterior shoulder dislocation.
E. Osteoarthritis.

Answer: A.

Frozen shoulder is an idiopathic condition that most commonly affects patients between the ages of 40 and 60. Diabetes mellitus is the most common risk factor for frozen shoulder. Symptoms include shoulder stiffness, loss of active and passive shoulder rotation, and severe pain, including night pain. Laboratory tests and plain films are normal; the diagnosis is clinical (SOR C). Frozen shoulder is differentiated from chronic posterior shoulder dislocation and osteoarthritis on the basis of radiologic findings. Both shoulder dislocation and osteoarthritis have characteristic plain film findings. A patient with a rotator cuff tear will have normal passive range of motion. Impingement syndrome does not affect passive range of motion, but there will be pain with elevation of the shoulder.

A 60-year-old African-American male who has a 15-year history of diabetes mellitus reports a 1-week history of weakness of the lower left leg, giving way of the knee, and discomfort in the anterior thigh. He has no history of recent trauma. A physical examination reveals decreased sensation to pinprick and light touch over the left anterior thigh, and reduced motor strength on hip flexion and knee extension. The straight leg raising test is normal. The most likely cause of this condition is

A. Femoral neuropathy.
B. Diabetic polyneuropathy.
C. Meralgia paresthetica.
D. Spinal stenosis.
E. Iliofemoral atherosclerosis.

Answer: A.

These findings are typical of femoral neuropathy, a mononeuropathy commonly associated with diabetes mellitus, although it has been found to be secondary to a number of conditions that are common in diabetics and not to the diabetes itself. Diabetic polyneuropathy is characterized by symmetric and distal limb sensory and motor deficits. Meralgia paresthetica, or lateral femoral cutaneous neuropathy, may be secondary to diabetes mellitus, but is manifested by numbness and paresthesia over the anterolateral thigh with no motor dysfunction. Spinal stenosis causes pain in the legs, but is not associated with the neurologic signs seen in this patient, nor with knee problems. Iliofemoral atherosclerosis, a relatively common complication of diabetes mellitus, may produce intermittent claudication involving one or both calf muscles but would not produce the motor weakness noted in this patient.

A 63-year-old male with type 2 diabetes mellitus is seen in the emergency department for an acute, superficial, previously untreated infected great toe. Along with Staphylococcus aureus, which one of the following is the most common pathogen in this situation?

A. Pseudomonas.
B. Streptococcus.
C. Clostridium.
D. Escherichia coli.
E. Adenovirus.

Answer: B.

The most common pathogens in previously untreated acute superficial foot infections in diabetic patients are aerobic gram-positive Staphylococcus aureus and _-hemolytic streptococci (groups A, B, and others). Previously treated and deep infections are often polymicrobial. You have diagnosed type 2 diabetes mellitus in

A 64-year-old male. He has no known coronary heart disease. You recommend lowering his LDL-cholesterol to below a threshold of:

A. 190 mg/dL.
B. 160 mg/dL.
C. 130 mg/dL.
D. 100 mg/dL.
E. 70 mg/dL.

Answer: E.

For patients with diabetes and ASCVD considered very high risk using specific criteria, if LDL cholesterol is ≥70 mg/dL on maximally tolerated statin dose, consider adding additional LDL-lowering therapy such as ezetimibe or PCSK9 inhibitor. (ADA 2022 guidelines).

A 55-year-old male with type 1 diabetes mellitus is being treated in the wound care clinic for a skin ulcer on his lower right leg. The ulcer is slow to improve. He comes to see you in the office because over the past 2 days his right knee has become swollen, red, warm, painful, and difficult to flex. When you examine him, his right knee is swollen, erythematous, indurated, and held in full extension. Active and passive ranges of motion are limited. Areas of erythema and induration continue to surround his leg ulcer. His WBC count is mildly elevated, but his erythrocyte sedimentation rate and C-reactive protein level are normal. Which one of the following would be most appropriate at this point?

A. Plain radiographs.
B. Ultrasonography.
C. MRI.
D. Arthrocentesis.
E. Antinuclear antibody studies.

Answer: D.

Any patient with risk factors for infection who presents with acute joint swelling, pain, erythema, warmth, and joint immobility should be evaluated for septic arthritis. Risk factors for septic arthritis in this patient include a cutaneous ulcer and diabetes mellitus. Serum markers such as the WBC count, erythrocyte sedimentation rate, and C-reactive protein levels are often used to determine the presence of infection or inflammatory response. However, patients with confirmed septic arthritis may have normal erythrocyte sedimentation rates and Creactive protein levels. Because the clinical presentation of septic arthritis may overlap with that of other causes of acute arthritis, arthrocentesis is needed to differentiate between the various causes and, in the case of septic arthritis, to identify the causative agent and determine appropriate therapy. No findings on imaging studies are pathognomonic for septic arthritis. Antinuclear antibody studies may be indicated later in the course of management if synovial fluid analysis is not consistent with infection, and if synovial fluid cultures are negative.

A 40-year-old male with diabetes mellitus has the following fasting lipid profile:
Total cholesterol_ 204 mg/dL
Triglycerides_ 223 mg/dL
Low-density lipoprotein (LDL)__ _ _ _ _ _ _ _ _ _ _ _ 112 mg/dL

High-density lipoprotein (HDL)_ _ _ _ _ _ _ _ _ _ _ _ 42 mg/dL

The patient is currently on simvastatin (Zocor), 40 mg, for management of his dyslipidemia. Which one of the following would be most appropriate?

A. Continuing the current medication regimen.
B. Increasing the dosage of simvastatin.
C. Switching to atorvastatin (Lipitor).
D. Adding gemfibrozil (Lopid).

Answer: C.

This patient does not meet the LDL-cholesterol goals for a diabetic patient and therefore needs adjustment of his antihyperlipidemic regimen. In June 2011, the Food and Drug Administration recommended limiting the use of the highest dosage of simvastatin (80 mg/day) because of concerns about an increased risk of muscle damage. This dosage should only be used in patients who have already been taking 80 mg/day for 12 months or more without evidence of muscle injury, and it should not be started in new patients. This patient should be switched to an alternative medication that provides a greater reduction of LDL-cholesterol, such as atorvastatin. Gemfibrozil is contraindicated for use with simvastatin because it can raise simvastatin drug levels and increase the risk of myopathy.

A 47-year-old female with a 10-year history of type 2 diabetes mellitus is concerned about the recent onset of swelling in her legs accompanied by a sudden weight gain of 8 lb. She is also experiencing increased fatigue and shortness of breath with mild exertion. On examination she has a blood pressure of 150/95 mm Hg, which is above her baseline of 130/85 mm Hg. Her lungs are clear to auscultation and a cardiac examination is also normal. She has no hepatosplenomegaly, but her legs are swollen to the level of the midtibia bilaterally. You are concerned that her symptoms and examination findings may be related to an underlying renal pathology. To confirm your suspicion, the most appropriate diagnostic test at this time would be:

A. A spot urine protein to creatinine ratio.
B. A 24-hour urine creatinine determination.
C. Renal ultrasonography.
D. Renal enhanced MRI.
E. A renal biopsy.

Answer: A.

This patient has type 2 diabetes mellitus and presents with new-onset edema in her lower extremities, the most common presenting symptom of nephrotic syndrome (NS). Patients with NS may also report foamy urine, exertional dyspnea or fatigue, and significant fluid-associated weight gain. A 24-hour urine collection for protein (not creatinine) can be used to diagnose proteinuria, but the collection process is cumbersome and the specimen is often collected incorrectly. The protein-to-creatinine ratio from a single urine sample is commonly used to diagnose nephrotic-range proteinuria. The role of a renal biopsy in patients with NS is controversial and there are no evidence-based guidelines regarding indications for a biopsy. Renal ultrasonography may be appropriate to assess for underlying conditions and/or disease complications if the glomerular filtration rate is reduced. There is no data to support using MRI in the diagnosis and management of nephrotic syndrome.

An 18-year-old morbidly obese patient in your office is found to have a fasting glucose of 314 mg/dL. Which of the following test results would indicate that he is a type 1 diabetic?

A. Low levels of C-peptide.
B. Markedly elevated levels of C-peptide.
C. Elevated levels of microalbumin in the urine.
D. A markedly elevated hemoglobin A1C.
E. The presence of parietal cell antibodies.

Answer: A.
In the past, young adults diagnosed with diabetes were primarily type 1 (T1DM). However, the epidemic of obesity in the United States has increased the rate of T2DM in people less than 20 years old from 5% to 30% over the last decade. C-terminal peptide is cleaved from natively produced insulin. Fasting C-peptide levels are markedly elevated in patients with T2DM, but in people with T1DM, C-peptide levels should be low due to the absence of native insulin. Microalbuminuria, markedly elevated hemoglobin A1C, and peripheral neuropathy can all occur in type 1 or 2 diabetes. T1DM is caused by autoimmune destruction of the pancreatic islet cells and the antibody glutamic acid decarboxylase (GAD 65) is most commonly used to diagnose T1DM. Parietal cell antibodies are not associated with T1DM, but with pernicious anemia. For the next 3 questions, use the following clinical scenario:

You are managing a 36-year-old woman with a new diagnosis of T2DM. Past medical history includes depression, venous insufficiency, and gestational diabetes with each of her pregnancies. Her fasting plasma glucose is 287 mg/dL, the remainder of her metabolic panel is normal, and her hemoglobin A1C is 9.2%. Urinalysis is normal, but her albumin-to creatinine ratio is elevated. She has no previous evidence of kidney disease. Her BMI is 33 kg/m2 and her blood pressure is 128/76. She denies any symptoms of hyperglycemia, including polydipsia, polyphagia, or blurred vision. What is the most appropriate first course of action for this patient?

A. Admit her to the hospital and start an insulin drip and replace electrolytes as needed.
B. Start metformin 1000 mg twice daily.
C. Start insulin glargine 0.2 U/kg/d.
D. Start metformin and a glucagon-like-peptide 1 (GLP-1) receptor agonist.
E. Start metformin and a thiazolidinedione (TZD).

Answer: D.
The ADA recommends dietary modifications and pharmacologic therapy at diagnosis of T2DM based on A1C and glucose levels. For patients with an A1C less than 9%, consider monotherapy; for patients with an A1C more than or equal to 9%, consider dual therapy, and for patients with an A1C more than or equal to 10%, blood glucose more than or equal to 300 mg/dL, or marked symptoms, consider combination injectable therapy. Patients with diabetic ketoacidosis or hyperosmolar hyperglycemia should be treated inpatient with an initial insulin drip and close monitoring. This patient has a normal urinalysis/electrolyte and is asymptomatic, so it is unlikely she has either condition. Dual therapy should be considered for this patient. In the absence of CVD, the ADA recommends metformin plus a second agent selected based on consideration of drug-specific effects and

patient factors. A GLP-1 receptor agonist would be an appropriate choice for this patient due to their neutral or negative effects on body weight. TZDs tend to cause fluid retention and should not be used in patients with congestive heart failure. In her case, it would likely negatively affect her venous insufficiency. Insulin alone is not an appropriate initial therapy, but may be appropriate in combination with metformin.

At this time, how would you address this patient's positive microalbumin screen?

A. Initiate therapy with an ACE-inhibitor.
B. Initiate therapy with an ARB.
C. Prescribe a low-protein diet.
D. Optimize glycemic control and repeat screening.
E. Refer to endocrinology.

Answer: D.
All patients with T2DM should be screened annually for albuminuria with a urinary albumin-to creatinine ratio through a random urine collection. However, two of three specimens in a 3- to 6-month period of time should be abnormal before considering a patient to have albuminuria. When albuminuria is confirmed, patients with T2DM should be treated with an ACE-inhibitor (or an ARB if they are intolerant of ACEs) to slow the progression toward ESRD. Referral to nephrology is indicated when the GFR falls below 60, or when the albumin-tocreatinine ratio exceeds 300 mg/g, or if the cause of the kidney disease is unclear. Patients with albuminuria should limit dietary protein intake to 0.8g/kg body weight/day. However, this patient has only had one positive albumin-to-creatinine ratio and the most appropriate therapy at this time would be to optimize her glycemic control and repeat the screening in 3 months.

Considering this patient's diagnosis and history, which of the following is true regarding retinopathy prevention and surveillance?

A. A daily aspirin will reduce her retinopathy risk.
B. She should have a dilated eye examination now and quarterly until her A1C is at goal.
C. Lowering her A1C does not reduce retinopathy risk.
D. She should have an annual dilated eye examination beginning at diagnosis.
E. Retinopathy occurs at lower levels of hemoglobin A1C for Caucasian patients.

Answer: D.
Diabetic retinopathy is the leading cause of blindness in the United States. The risk increases with the length of time that the patient has had diabetes, and the condition worsens with increasing hemoglobin A1C levels. However, African-American patients develop retinopathy at lower levels of A1C. In type 2 diabetics it can be seen at diagnosis, and yearly dilated eye examinations are recommended beginning at the time of diagnosis. In patients with T1DM, dilated eye examinations should begin 5 years after diagnosis. More frequent examinations may be indicated in patients when eye pathology is present. Aspirin has no effect on eye complications.

You are seeing an African-American man with newly diagnosed diabetes. His blood pressure at the last visit was 148/76 mm Hg, and at this visit it is 152/82 mm Hg. He has no evidence of CVD or CKD and is not on any antihypertensive agents. Which of the following statements is true regarding the use of an ACE-inhibitor in this patient?

A. An ACE-inhibitor should be added to his regimen because he is diabetic, regardless of his blood pressure.
B. An ACE-inhibitor is the preferred agent to be added to his regimen based on his blood pressure readings.
C. An ACE-inhibitor should not be added to his regimen unless his blood pressure goes above 160 systolic.
D. An ACE-inhibitor should not be added to his regimen unless he has microalbuminuria.
E. An ACE-inhibitor should not be given to this patient if his creatinine is elevated.

Answer: D.

ACE-inhibitors are clearly the first choice for blood pressure control in diabetic patients with CKD. They control blood pressure effectively, help prevent progression of renal disease, and are indicated in the presence of coronary disease and CHF. Although compelling, there is insufficient evidence to recommend ACE-inhibitors in all diabetic patients. According to the Eighth Joint National Committee (JNC-8) guidelines, African American patients with T2DM without albuminuria and blood pressure readings between 140/90- and 160/100-mm Hg should receive either a thiazide-type diuretic or a calcium channel blocker alone or in combination as initial treatment. If albuminuria is present, an ACE or an ARB should be considered first. Among these four classes of medication, the ADA guidelines don’t specify a preferred initial agent unless albuminuria is present, then they recommend an ACE or ARB preferentially. ACE/ARBs can be used irrespective of creatinine levels, though potassium should be monitored as creatinine rises. You are seeing

A 75-year-old male patient with a 10-year history of T2DM for his 3- month diabetes follow-up. He takes 20 units of insulin glargine at bedtime and 1000 mg of metformin twice daily. His home glucose readings show fasting sugars in the range of 60 to 130 and post-prandial readings in the range of 145 to 210. His A1C today is 8.2%. He has several comorbidities, including CHF, hypertension, CKD, and a history of a myocardial infarction (MI) 3 years ago. He has had several falls and difficulty with ambulation because of diabetic neuropathy. His daughter is concerned about his episodes of low blood sugar, but he states they don’t bother him. What A1C goal would you recommend for this patient?

A. Around 6.5%.
B. Around 7.0%.
C. Around 7.5%.
D. Around 8.0%.
E. Around 8.5%.

Answer: E.

The ADA recommends an A1C glycemic target of less than 7% for nonpregnant adults; however, providers may suggest less stringent goals for individual patients if this cannot be achieved without significant hypoglycemia. Less stringent goals may also be appropriate for patients with a history of severe hypoglycemia, limited life expectancy, advanced microvascular or macrovascular complications, extensive comorbid conditions, or longstanding diabetes that is difficult to control. This patient is elderly, with multiple comorbidities and evidence of hypoglycemia. The presence of hypoglycemia, especially severe or asymptomatic hypoglycemia, should prompt the clinician to raise this patient’s glycemic targets to avoid hypoglycemia, because it is associated with increased morbidity and mortality. His current A1C is 8.2% and the only answer choice that is less stringent is 8.5%.

A 44-year-old African American with T2DM transfers care to you. Reviewing her records, you find she is on the maximum dose of metformin and her hemoglobin A1C is 7.0%. Review of her baseline laboratory tests reveals normal liver enzymes and a creatinine of 2.3 mg/dL (GFR 35 mL/min/1.73 m2). Her BMI is 26 kg/m2. She is hypertensive and is well controlled on a thiazide diuretic and an ACE inhibitor. Which of the following management options would be the most beneficial?

A. Continue the current regimen.
B. Add glyburide.
C. Discontinue the metformin and add linagliptin.
D. Discontinue the metformin and add dapagliflozin.
E. Add sitagliptin.

Answer: C.

The decline of renal function can make maintaining glycemic control a challenging endeavor. Metformin, due to the risk of lactic acidosis, should be avoided in patients with a GFR less than 45 mL/min/1.73 m2. This patient has good glycemic control, but her declining renal function demands a change in her regimen. Sulfonylureas (glyburide, glipizide, and glimepiride) should also be avoided in patients with significant renal impairment, due to their renal clearance and the increasing risk of hypoglycemia. Sodium glucose cotransporter 2 (SGLT-2) inhibitors (dapagliflozin, canagliflozin, and empagliflozin) should be avoided or discontinued in patients with a GFR of 30 to 60 mL/min/1.73 m2. DPP-4 inhibitors have varying degrees of utility and dosing adjustment in patients with renal impairment, but linagliptin is not cleared by the kidneys and, therefore, requires no dosing adjustment in CKD.

You are seeing a 29-year-old woman for a T2DM follow-up visit. She has been taking a GLP-1 receptor agonist for the last 6 months and complains that the side effects are too bothersome and she would like to switch medications. You recommend a dipeptidyl peptidase 4 (DPP-4) inhibitor. Which of the following statements is true about the GLP-1 receptor agonists compared to the DPP-4 inhibitors?

A. Both agents result in a supraphysiologic increase in GLP-1 in the body.
B. Both agents have similar effects on bodyweight.
C. Both GLP-1 receptor agonists and DPP-4 inhibitors increase glucose-dependent insulin secretion from the pancreas.
D. Both GLP-1 receptor agonists and DPP-4 inhibitors increase gluconeogenesis in the liver.
E. Both GLP-1 receptor agonists and DPP-4 inhibitors slow gastric emptying.

Answer: C.

GLP-1 is a gut hormone that, when stimulated by an oral glucose load, stimulates insulin secretion. This “incretin” effect is diminished in patients with T2DM. Native GLP-1 has a half-life of only a few minutes due to breakdown by the enzyme DPP-4, while GLP-1 receptor agonists are resistant to the effects of DPP-4 and result in supraphysiologic levels of GLP-1 in the body. DPP-4 inhibitors, in contrast, prolong the action of physiologic GLP-1, restoring levels comparable to healthy controls. This results in drug classes with varying efficacy and sideeffect profiles. Both DPP-4 inhibitors and GLP-1 receptor agonists increase glucose-dependent insulin secretion from the pancreas and decrease glucagon production in the liver. However, the GLP-1 receptor agonists slow gastric emptying, increase satiety, and have a weight loss effect. This slowed gastric emptying is also responsible for the most frequent adverse reactions of nausea and vomiting. The DPP-4 inhibitors have a weight-neutral profile with an absence of GI side effects.

You have been treating a 46-year-old woman for T2DM for 2 years with metformin and recently started insulin glargine at night. She is compliant with her diet and medications, and exercises regularly. She is 65 inches tall and weighs 200 lb. Her most recent HbA1C is 9.0% which is elevated from 8.8% 3 months ago. When you added the insulin regimen, she had hypoglycemic episodes, so at her visit 2 weeks ago, you added the sodium-glucose cotransporter 2 (SGLT-2) inhibitor, dapagliflozin to her regimen and stopped her insulin. The patient presents today complaining of a problem that she attributes to the new medication. Which of the following is the most likely complaint?

A. Symptomatic hypoglycemia.
B. Edema and weight gain.
C. Cough.
D. Urinary tract infection.
E. GI intolerance.

Answer: D.
SGLT-2 inhibitors block renal reabsorption of glucose, causing urinary excretion of excess glucose. The most common side effects of SGLT-2 inhibitors are orthostatic hypotension, urinary tract infections, and vaginal yeast infections. Hypoglycemia can occur with any antihyperglycemic agent, but is not a prominent side effect of SGLT-2s. Edema and weight gain are common side effects of TZDs, while cough occurs in some patients who take ACE inhibitors. GI intolerance, including nausea and vomiting or diarrhea, is common with metformin and GLP-1 receptor agonists.

You are caring for a patient with T2DM whose measures of control have been worsening despite maximal doses of oral medications. You are considering adding insulin therapy to help with her postprandial hyperglycemia and want to start a preparation with a rapid onset of action. Which of the following insulin types has the most rapid onset of action?

A. Aspart (NovoLog).
B. Regular.
C. Neutral protamine Hagedorn (NPH).
D. Detemir (Levemir).
E. Glargine (Lantus).

Answer: A.
It is important to thoroughly understand the action of the different types of insulin preparations in order to make therapeutic decisions about diabetic patients and their control. Aspart, lispro (Humalog), and glulisine (Apidra) have the most rapid onset of action, between 15 and 30 minutes. Regular insulin has an onset between 30 and 60 minutes. NPH has an onset between 1 and 2 hours, as does glargine (Lantus) and detemir (Levemir). You are thinking about starting a patient with T2DM on insulin therapy to improve her glucose control. You would like to provide her with steady insulin action without much of a peak time.

Which of the following insulin preparations provides the most stable insulin coverage without a peak time of maximum activity?

A. Aspart (Novolog).
B. Lispro (Humalog).
C. Regular.
D. NPH.
E. Glargine (Lantus).

Answer: E.
It is important to thoroughly understand the action of the different types of insulin preparations in order to make therapeutic decisions about diabetic patients and their control. Lispro's activity peaks early, between 30 and 90 minutes after injection. Aspart's activity peaks around 1 and 3 hours after injection. Regular insulin peaks between 2 and 4 hours after injection. NPH peaks 5 to 7 hours after injection. Glargine (Lantus) and Detemir (Levemir) do not have a predictable peak, and last for around 20 and 24 hours. Insulin degludec (Tresiba) has an effective duration of 42 hours.

You have maximized oral anti-hyperglycemic therapy for a 56-year-old female patient with T2DM, hypertension, dyslipidemia, and obesity. She works hard at diet and exercise, but her hemoglobin A1C is still elevated at 9.6%. You decide to add insulin to her regimen. She is currently 67 in tall and weighs 100 kg. You decide to start her on 10 units of glargine (Lantus) at night in addition to her current regimen. Which of the following recommendations would you make for this patient regarding self monitoring of blood glucose (SMBG)?

A. She should test her blood glucose levels any time of day.
B. She should not check her blood glucose levels, as there is no evidence to suggest that it is helpful for patients on only basal insulin.
C. She should check her blood glucose levels, but she doesn't need to bring her glucose log with her to appointments.
D. She should check blood glucose levels once a day, fasting, and receive education about how to make adjustments to her meals and insulin based on these readings.
E. She should check her blood glucose levels fasting, after meals, and at bedtime.

Answer: D.
Patients with T2DM may require insulin therapy if diet, exercise, and oral hypoglycemic agent do not provide

appropriate control. A low initiating dose of insulin glargine is commonly used, estimating 0.1 U/kg of body weight, as an addition to the current regimen. The dose can be titrated over time to meet fasting blood glucose targets. The utility and frequency of SMBG is dependent on the type of regimen the patient is prescribed and what they do with the information. For T2DM patients on intensive basal bolus insulin regimens, clinical trials show testing up to 6 to 10 times/day is associated with lower A1C levels. For T2DM patients on basal insulin and/or oral agents, the evidence is not as clear. Generally, patients on basal insulin should check at least fasting blood glucose levels and use those levels to make adjustments to their basal insulin dose; this is associated with lower A1Cs. Several studies have not shown much benefit to SMBG in noninsulin treated patients. The most important factors of whether SMBG lowers blood glucose are educating about and acting on the information. Therefore, patients should receive education about how to manage their blood glucose levels and clinicians should review and make recommendations on their patients' levels.

You are seeing a 57-year-old diabetic who has been recently started on insulin therapy. He is arguing with his wife over the best location to give his injections—he has been using his thigh and she insists that he should do the injections in his belly as her aunt who had diabetes used to do. Which one of the following statements is true regarding insulin injections?

A. Absorption from the buttock is rapid and can be used as a site just before eating.
B. Rotation of injections to different zones of the body can cause wide variations in serum glucose levels.
C. Injection in the arm often leads to exercise-induced hypoglycemia.
D. The thigh is the best site for reliable and predictable absorption.

Answer: B.

Insulin may be injected into the subcutaneous tissue of the upper arm and the anterior and lateral aspects of the thigh, buttocks, and abdomen (with the exception of a circle with a 2-inch radius around the navel). Intramuscular injection is not recommended for routine injections. Rotation of the injection site is important to prevent lipohypertrophy or lipoatrophy. Rotating within one area is recommended (e.g., rotating injections systematically within the abdomen) rather than rotating to a different area with each injection. This practice may decrease variability in absorption from day to day. Site selection should take into consideration the variable absorption between sites. The abdomen has the fastest rate of absorption, followed by the arms, thighs, and buttocks. Exercise increases the rate of absorption from injection sites, probably by increasing blood flow to the skin and perhaps also by local actions. Areas of lipohypertrophy usually show slower absorption. The rate of absorption also differs between subcutaneous and intramuscular sites. The latter is faster and, although not recommended for routine use, can be given under other circumstances (e.g., diabetic ketoacidosis or dehydration).

An 83-year-old man who was diagnosed with type 2 diabetes 3 months ago. He has altered his diet and tries to walk at least half a mile in the evenings. For the past week he has felt dizzy upon standing and has fallen on two occasions but he never lost consciousness. After the last episode he presented to the local ER where his blood pressure was found to be 155/76 mm Hg, HR 74 beats/min, and RR 16 breaths/min. A finger stick showed a glucose level of 84. Which of the following classes of medications has the lowest incidence of causing hypoglycemia when given as single-agent therapy?

A. Biguanide.
B. Insulin.
C. Sulfonylurea.
D. Meglitinide.

Answer: A.
Metformin is unlike some oral agents it does not significantly increase the risk of hypoglycemia. Since metformin does not directly stimulate insulin secretion, hypoglycemia risk may be lower than for that of other oral antidiabetic drugs. However, hypoglycemia in patients using metformin may occur in association with strenuous physical activity or fasting.

A 48-year-old male newly diagnosed diabetic comes to the clinic for follow up. He wants to try lifestyle modification, including diet and exercise before trying medications. He has lost 4 kg, but still is 12 kg overweight. His physical examination and chemistry profile are unremarkable. His hemoglobin A1C level is 8.6%. Which one of the following would be the appropriate medication at this time?

A. Rosiglitazone.
B. Metformin.
C. Glyburide.
D. Exenatide.

Answer: B.
Metformin should be started at the time type 2 diabetes is diagnosed unless there are contraindications; Metformin is effective and safe, is inexpensive, and may reduce risk of cardiovascular events and death. Metformin is available in an immediate-release form for twice- daily dosing or as an extended-release form that can be given once daily.

The minimum amount of weight loss that generally improves glycemic control in patients with type 2 diabetes is about:

A. 20 percent of starting weight.
B. 5 percent of starting weight.
C. 15 percent of starting weight.
D. 10 percent of starting weight.

Answer: B.
Management and reduction of weight is important for people with type 1 diabetes, type 2 diabetes, or prediabetes and overweight or obesity. In prediabetes, the weight loss goal is 7–10% for preventing progression to type 2 diabetes. For many individuals with overweight and obesity with type 2 diabetes, 5% weight loss is needed to achieve beneficial outcomes in glycemic control, lipids, and blood pressure. It should be noted, however, that the clinical benefits of weight loss are progressive, and more intensive weight loss goals (i.e., 15%)

may be appropriate to maximize benefit depending on need, feasibility, and safety. All patients with overweight or obesity, lifestyle modification to achieve and maintain a minimum weight loss of 5% is recommended for all patients with diabetes and prediabetes. (A).

Patient known case of T2DM on oral hypoglycemic agents. Complaining from seizure like attack. Which of the following can cause these attacks?

A. Acarbose.
B. Metformin.
C. Sitagliptin.
D. Sulfonylurea.

Answer: D.
Sulfonylureas and other insulin secretagogues are associated with hypoglycemia and should be used with caution. If used, sulfonylureas with a shorter duration of action, such as glipizide or glimepiride, are preferred. Glyburide is a longer-acting sulfonylurea and should be avoided in older adults. Symptoms of hypoglycemia include, but are not limited to, shakiness, irritability, confusion, tachycardia, and hunger. Hypoglycemia may be inconvenient or frightening to patients with diabetes. Level 3 hypoglycemia may be recognized or unrecognized and can progress to loss of consciousness, seizure, coma, or death. It is reversed by administration of rapidacting glucose or glucagon.

A-32-years old lady G3P3 with GDM in last 2 pregnancies, and history of chlamydia and Gonorrhea. What you will do for her?

A. Fasting blood sugar every 3 years.
B. Pap Smear every 3 years.
C. Mammogram every 3 years.
D. CXR.

Answer: A.
- Test for undiagnosed prediabetes and diabetes at the first prenatal visit in those with risk factors using standard diagnostic criteria.
- Test for gestational diabetes mellitus at 24–28 weeks of gestation in pregnant women not previously found to have diabetes.
- Test women with gestational diabetes mellitus for prediabetes or diabetes at 4–12 weeks postpartum, using the 75-g oral glucose tolerance test and clinically appropriate nonpregnancy diagnostic criteria.
- Women with a history of gestational diabetes mellitus should have lifelong screening for the development of diabetes or pre- diabetes at least every 3 years.
- Women with a history of gestational diabetes mellitus found to have prediabetes should receive intensive lifestyle interventions and/or metformin to prevent diabetes.

A 23-year-old female known case of diabetes mellitus type 1. Her Last pap smear was 3 months ago and last fundoscopy examination 6 months ago. Her BMI is 23. What will you do for her in this visit?

A. Influenza vaccine.
B. Pap smear.
C. Mammogram.
D. Fundoscopy examination.

Answer: A.

People with diabetes are at higher risk for hepatitis B infection and are more likely to develop complications from influenza and pneumococcal disease. The CDC Advisory Committee on Immunization Practices (ACIP) recommends influenza, pneumococcal, and hepatitis B vaccinations specifically for people with diabetes. Vaccinations against tetanus-diphtheria-pertussis, measles-mumps-rubella, human papilloma virus, and shingles are also important for adults with diabetes, as they are for the general population. Influenza vaccination in people with diabetes has been found to significantly reduce influenza and diabetes-related hospital admissions.

An 80-year-old man has diabetes mellitus and dementia brought by his family because he can't take his medication or control his diet, what's your advice to the family?

A. Keep HA1c < 7.
B. Avoid hypoglycemia.
C. Keep FBS < 6.5.

Answer: B.

In type 2 diabetes, severe hypoglycemia is associated with reduced cognitive function, and those with poor cognitive function have more severe hypoglycemia. Older adults who are otherwise healthy with few coexisting chronic illnesses and intact cognitive function and functional status should have lower glycemic goals (such as A1C ,7.5% [58 mmol/mol]), while those with multiple coexisting chronic illnesses, cognitive impairment, or functional dependence should have less-stringent glycemic goals (such as A1C ,8.0–8.5% [64–69 mmol/mol]). (C) Glycemic goals for some older adults might reasonably be relaxed as part of individualized care, but hyperglycemia leading to symptoms or risk of acute hyperglycemia complications should be avoided in all patients.

A 40-year-old overweigh female known case of T2DM. Regarding anti-diabetic medication, which drug that increase insulin sensitivity?

A. Metformin.
B. Sulfonylureas.
C. Meglitinides.
D. Sitagliptin.

Answer: A.

Biguanides and thiazolidinediones are insulin sensitizers that decrease hepatic glucose production and increase insulin sensitivity. Sulfonylureas and meglitinides stimulate pancreatic insulin secretion, while DPP-4 inhibitors prevent GLP-1 breakdown and slow the breakdown of some sugars. GLP-1 mimetics stimulate insulin secretion, suppress glucagon secretion, and promote cell production. Amylin analogs act with insulin to delay gastric emptying and they also inhibit glucagon release.

45-year-old male diabetic patient on Metformin and Gliclazide but uncontrolled. He has a family history of thyroid cancers. What you will add?

A. GLP1 agonist.
B. DPP4.
C. Thiazolidinediones.
D. Sulfonylureas.

Answer: B.

Liraglutide is contraindicated in patients with a personal or family history of medullary thyroid carcinoma or in patients with multiple endocrine neoplasia syndrome type 2.

Which of the following diabetic medications is contraindicated in congestive heart failure?

A. Metformin.
B. Pioglitazone.
C. Sitagliptin.
D. Exenatide.

Answer: B.

US Boxed Warning, Congestive heart failure: Thiazolidinediones, including pioglitazone and Rosiglitazone, can cause or exacerbate congestive heart failure (CHF) in some patients. After initiation of pioglitazone, and after dose increases, observe patients carefully for signs and symptoms of heart failure (including excessive, rapid weight gain, dyspnea, and/or edema). If these signs and symptoms develop, manage the heart failure according to the current standards of care. Furthermore, discontinuation or dose reduction of pioglitazone must be considered. Pioglitazone and Rosiglitazone are not recommended in patients with symptomatic heart failure. Initiation of pioglitazone and Rosiglitazone in patients with established New York Heart Association (NYHA) class III or IV heart failure is contraindicated.

A 50-year-old male with uncontrolled diabetes mellitus present to the clinic for follow up. You decide to start him on insulin but the patient has misconception about insulin, what you will do?

A. Reject his opinion directly.
B. Teach him about the cause and effect of insulin.
C. Tell him his fear based on facts.

Answer: B.

Many patients with type 2 diabetes eventually require and benefit from insulin therapy. The progressive nature of type 2 diabetes should be regularly and objectively explained to patients, and providers should avoid using insulin as a threat or describing it as a sign of personal failure or punishment. Rather, the utility and importance of insulin to maintain glycemic control once progression of the disease overcomes the effect of other agents should be emphasized. Educating and involving patients in insulin management is beneficial. For example, instruction of patients in self-titration of insulin doses based on self-monitoring of blood glucose improves glycemic control in patients with type 2 diabetes initiating insulin. Comprehensive education regarding selfmonitoring of blood glucose, diet, and the avoidance and appropriate treatment of hypoglycemia are critically important in any patient using insulin.

A 40 years old male known case of diabetes mellitus need to do C.T. scan with contrast. He is on Basal insulin and Metformin. Which of the following is most appropriate?

A. Stop Metformin before and after procedure by 48 hours.
B. Stop the Insulin before and after procedure by 48 hours.
C. Stop Metformin after procedure for 24 hours.
D. Stop Insulin after procedure for 24 hours.

Answer: A.

Metformin can increase the risk for lactic acidosis in patients with severe renal dysfunction (ie, estimated glomerular filtration rate [eGFR] <30 mL/min/1.73m2) and is contraindicated in this setting. If the patient has normal or mildly impaired renal function (ie, eGFR ≥30 mL/min/1.73m2), metformin need not be withheld before the CT examination and the patient's renal function does not need to be followed after contrast administration. The American College of Radiology suggests there is no need to discontinue metformin prior to or following the intravenous administration of iodinated contrast media in patients with no evidence of acute kidney injury and with eGFR ≥30 mL/min/1.73 m2. This recommendation was presumably predicated on the increasing uncertainty regarding the role of contrast-dye procedures in acute kidney injury and the overall rarity of lactic acidosis in metformin-treated patients. Until more data are available, however, and taking into account the morbidity and mortality of metformin-associated lactic acidosis, we prefer to hold metformin in patients at increased risk for lactic acidosis (eg, vascular instability, hypotension, potential hypo perfusion) independent of metformin, as described in the bullet above. (UpToDate)

A 49 years old black woman with a body mass index (BMI) of 42 kg/m2 presents with a 6-month history of fatigue and lethargy. Over the past few days she has become increasingly thirsty, is getting up at night to pass urine and has experienced some dysuria. On admission, blood glucose was measured at 40 mmol/L (720 mg/dL) with ketones of 4 mmol/L and bicarbonate 12 mmol/L. She is treated for diabetic ketoacidosis (DKA), but what is the most likely underlying diagnosis?

A. Impaired glucose tolerance.
B. Metabolic syndrome.
C. Type 1 diabetes mellitus.
D. Type 2 diabetes mellitus.

Answer: D.

DKA usually develops slowly. But when vomiting occurs, this life-threatening condition can develop in a few hours. Early symptoms include the following: Thirst or a very dry mouth, Frequent urination, High blood glucose levels, High levels of ketones in the urine. Patient presenting with diabetic Ketoacidosis may have type 1 or type 2 diabetes. Consider ketosis prone type 2 diabetes in older, overweight, non-white patients who present with diabetic ketoacidosis as their first presentation of diabetes; this diagnosis is also a possibility in patient with any feature that are atypical for type 1 diabetes.

A 70-year-old diabetic patient came to the clinic for his annual diabetes follow-up. He is known to have type-2 Diabetes for the last 20 years and currently on Insulin. He is also on lisinopril (ACI) 20 mg daily for hypertension and takes Omeprazole (PPI) 20 mg daily for gastroesophageal reflux. The patient has been complaining of recurrent syncopal attacks preceded by palpitation, sweating and tremor. On examination Vital Signs: BP 130/70 mmHg, HR 85/ min, RR 18/min, SpO2 97%. His last blood test results: FBG = 4 (Normal range 4.2 – 6.4 mmol/l), HbA1C 5.2% (Normal rang 3.5-5 mmol/l), Hb 110 (Normal rang 140-180 g/l), Ferritin 10 (15-400 mg/l Normal range). What is the most important next step in managing his complain?

A. Add iron tablets.
B. Stop omeprazole.
C. Review his Insulin dose.
D. Reduce the dose of Lisinopril.

Answer: C.

Hypoglycemia causes neurogenic (autonomic) and neuroglycopenic symptoms. Older adults and patients with long-term diabetes may have more neuroglycopenic than neurogenic manifestations of hypoglycemia. The neurogenic symptoms include tremor, palpitations, and anxiety/arousal (catecholamine-mediated, adrenergic)and sweating, hunger, and paresthesias (acetylcholine-mediated, cholinergic). The neuroglycopenic symptoms include dizziness, weakness, drowsiness, delirium, confusion, and, at lower plasma glucose concentrations, seizure and coma. Although profound, prolonged hypoglycemia can cause brain death in the unobserved patient with diabetes, the vast majority of episodes are reversed after the glucose level is raised. The rare fatal episodes are generally thought to be the result of ventricular arrhythmia. In patients with diabetes, the onset of symptoms of hypoglycemia may occur at glucose levels less than 65 mg/dL (3.6 mmol/L), although the specific value varies between and within individuals over time. Patients with repeated episodes of hypoglycemia, such as may be caused by intensive therapy of diabetes. The prevention of hypoglycemia involves assessing for risk factors and tailoring treatment regimens to reduce risk.

A female Patient which is a known case of T2DM on metformin, came for evaluation for her numbness. On examination: absent ankle reflex and a positive Babinski sign. Her is MCV: 106. What is most likely diagnosis?

A. Vitamin B12 deficiency.
B. Hypothyroidism.
C. Peripheral neuropathy.
D. Folate deficiency.

Answer: A.

Reduced absorption of vitamin B12 is a known adverse effect of long-term use of metformin (and other biguanides). The classic findings associated with vitamin B12 and folate deficiency include macrocytic anemia (mean corpuscular volume [MCV] >100 fL), yellow skin (caused by combined anemia and jaundice), and variable neurologic abnormalities more prominent in vitamin B12 deficiency (cognitive slowing and neuropathy). The neurologic finding in vitamin B12 deficiency is subacute combined degeneration of the dorsal (posterior) and lateral columns (white matter) of the spinal cord due to demyelination. It is characterized by mild distal weakness in the lower limbs associated with increased patellar reflexes, absent ankle reflexes, bilateral Babinski responses, unsteady gait, and positive Romberg sign. Vibration and proprioception are impaired.

A 75-year-old woman with diabetes for approximately 20 years, diabetic retinopathy, and diabetic nephropathy with creatinine level 2.2 mg/ dL is brought into the clinic by her daughter for follow-up. The patient currently takes a sulfonylurea for her diabetes and an ACE inhibitor for her proteinuria. Her daughter reports that, on three occasions in the past 2 weeks, her mother became sweaty, shaky, and confused, which resolved when she was given some orange juice. Which of the following conditions is most likely to be contributing to these episodes?

A. Excess caloric oral intake.
B. Interaction between the ACE inhibitor and the sulfonylurea agents.
C. Worsening renal function.
D. Hyperglycemic amnesia.

Answer: D.

A 19-year-old with insulin-dependent diabetes mellitus is taking 30 Units of NPH insulin at the morning and 15 Units at night. Because of persistent morning glycosuria with some ketonuria, the evening dose is increased to 20 U. This worsens the morning glycosuria and now moderate ketones are noted in urine. The patient complains of sweats and headaches at night. The next step in management is:

A. Stop the evening dose of insulin.
B. Obtaining blood sugar levels between 2 and 5 A.M.
C. Increasing the evening dose of insulin.
D. Increasing the morning dose of insulin.

Answer: B.

(Somogyi Phenomenon)

A 68 years old male known case of Diabetes millets came for follow up visit. He is on two hypoglycemic agents with no control. He forgets to take his medication sometimes. What is the best management for him?

A. Tell him that it might cause kidney damage or amputation of the limb.
B. Participate a family member in the management.
C. Increase follow up visit.
D. Switch to insulin.

Answer: B.

A 45 years old patient diagnosed for the first time with HTN. His HA1c is 18 and his creatinine is high. What is the cause of his renal deterioration?

A. Diabetic nephropathy.
B. HTN nephropathy.
C. Ischemic nephropathy.
D. Drug induced nephropathy.

Answer: A.

A diabetic patient on insulin glargine and short acting insulin. He is feeling dizziness and has sweating while he is walking on treadmill. Fasting blood sugar in morning 140 mg/dl. What are you going to do?

A. Snacks before exercising.
B. Skip one dose premeal.
C. Decrease dose of insulin glargine.
D. Change to NPH.

Answer: A.

Exercise-induced hypoglycemia — Exercise-induced hypoglycemia can occur during, shortly after, or many hours after exercise, and therefore, patients should remain vigilant for its occurrence, including frequent SMBG or CGM.

A diabetic patient with HA1c 11% and her weight is 120 kg. How to start insulin?

A. 10 units long-acting insulin.
B. Long-acting insulin 30 U and short acting 10 U premeal.
C. Insulin sliding scale.
D. 20 units short acting insulin.

Answer: A.

Pregnant lady on 16 weeks of gestation, presented for antenatal visit with the following labs: FBS= 7.3, HA1c = 6.9%. What is the most likely diagnosis?

A. Type 2 DM.
B. Gestational DM.
C. Impaired fasting glucose.
D. Normal pregnancy.

Answer: A.

Pregnant lady was pre-diabetic on metformin, now FBS is 100 mg/dl, what will you do?

A. Discontinue metformin and lifestyle.
B. Discontinue metformin and start low dose insulin.
C. Continue metformin and lifestyle.
D. Lifestyle only.

Answer: C.

Regarding glucose home monitoring:

A. Not useful in type 2 diabetes.
B. In most aggressive control, patient needs to check blood glucose every 6 hours.
C. Fasting blood glucose is most important to adjust basal insulin dose.
D. In general, it is not necessary in patient with type 2 DM.

Answer: C.

A 66-year-old male with a history of diabetes mellitus, hypertension, and venous insufficiency presents with a 3-cm diameter ulceration on his lateral lower leg. Recent vascular studies show no significant arterial occlusion and a foot monofilament examination is normal. You assess the wound and do not find significant devitalized tissue or signs of infection. Which one of the following interventions is most likely to promote wound healing?

A. A compression bandage.
B. Dermal matrix dressing.
C. Hydrogel dressing.
D. Wet-to-dry dressings.
E. Prescription diabetic footwear.

Answer: A.

Treatment of chronic wounds is a common clinical challenge in primary care. This case represents a venous stasis ulceration rather than a diabetic foot wound or pressure ulcer. When treating a wound, the treating physician should optimize factors that promote healing, including nutrition, smoking cessation, and blood glucose control. Local wound care should emphasize treating any infection, debriding devitalized tissue, avoiding ongoing pressure or shear force, and maintaining a clean and appropriately moist healing environment. Compression hose and bandages have been shown to improve healing times in venous stasis ulcers (SOR B). Wet-to-dry dressings or specialized dressings such as hydrogel or skin substitutes such as dermal matrix dressings have not been consistently shown to decrease healing times. Prescription diabetic footwear may be an important part of offloading diabetic foot wounds, but it is not relevant to a wound on the lower leg.

A 72-year-old female comes to your office to discuss newly diagnosed peripheral artery disease. She has a history of long-standing type 2 diabetes, hypertension, and hyperlipidemia. Her current medications include atorvastatin (Lipitor), 80 mg daily; metformin (Glucophage XR), 2000 mg daily; lisinopril (Prinivil, Zestril), 40 mg daily; and aspirin, 81 mg daily. On examination she has a blood pressure of 114/62 mm Hg. Laboratory studies reveal an LDL-cholesterol level of 68 mg/dL and a hemoglobin A1c of 7.7%. If added to her current regimen, which one of the following medications would most likely improve her walking distance?

A. Cilostazol.
B. Clopidogrel (Plavix).
C. Ezetimibe (Zetia).
D. Liraglutide (Victoza).
E. Warfarin (Coumadin).

Answer: A.

In patients with peripheral artery disease (PAD), cilostazol, a phosphodiesterase inhibitor with antiplatelet and vasodilatory properties, increases the maximal walking distance on a treadmill by approximately 25% compared with placebo. The side effects include tachycardia, diarrhea, and increased bleeding tendency, and it is contraindicated in patients with heart failure or a low ejection fraction. A supervised exercise program is also an important component of a comprehensive approach to PAD. In one trial a supervised exercise program resulted in an increase of 2.1 minutes of mean peak walking time at 6 months. Clopidogrel is an antiplatelet agent that has been shown to be slightly more effective than aspirin in reducing the risk of a composite outcome of ischemic stroke, myocardial infarction, or death from vascular causes. Dual antiplatelet therapy can be considered to reduce the risk of cardiovascular events though it carries an increased risk of bleeding. Warfarin has no evidence of benefit in PAD and adds to bleeding risk. Statins are associated with a lower risk of cardiovascular events in patients with PAD. Ezetimibe has no evidence of additional benefit.

According to the American Diabetes Association, which one of the following would be the most appropriate advice?

A. Sucrose (table sugar) is preferred.
B. Nonnutritive sweeteners are acceptable to use.
C. Nonnutritive sweeteners worsen glucose control.
D. Sucralose-based sweeteners, such as Splenda, should be avoided.
E. Sweeteners with aspartame, such as Equal, should be avoided.

Answer: B.

Nonnutritive sweeteners contain few or no calories. According to the American Diabetes Association, nonnutritive sweeteners may be acceptable to use instead of nutritive sweeteners such as sucrose. They should be used in moderation if they are used. The use of nonnutritive sweeteners can help to reduce overall intake of carbohydrates and calories. They do not significantly affect glycemic control. Research is inconsistent regarding the effects of nonnutritive sweeteners on weight loss, but most systematic reviews and meta-analyses demonstrate a benefit. There is no recommendation to avoid sucralose or aspartame in patients with type 2 diabetes. Beverages sweetened with sugar are associated with an increased risk of type 2 diabetes

Pregnant lady, GA 12 weeks came for antenatal care for the first time with previous history of GDM, what is the best for her?

A. FBS
B. 2-hr 75g-OGTT
C. HbA1C
D. random blood glucose

Answer: B

Previous GDM → screen from the 1st ANC visit:
+ve → treat accordingly
-ve → Re-screening @24-28 wks as general population Screening options: One-step → 2-hr 75g-OGTT
Two-steps → 50g-GCT (no need for fasting) then if +ve → Confirm with 3-hrs 100g-OGTT
❌ FBS alone or Random blood glucose alone: will not diagnose GDM.
❌ HbA1C: is used ONLY after GDM is confirmed, to know if it is GDM or chronic DM.

Patient K/C of DM and HTN for 10 years, C/O bilateral symmetrical numbness & burning sensation in the feet Exam: his symptoms were provoked by a gentle touch sensation

A. postherpetic neuralgia
B. complex regional pain syndrome
C. Diabetic neuropathy

Answer:C

Uncontrolled DM → DM neuropathy (Distal symmetrical sensorimotor polyneuropathy) "Stocking glove neuropathy" (symmetrical bilateral numbness & burning)

Diabetic patient with 30% ejection fraction, he's on metformin & glipizide, bilateral lower limb edema up to mid-thigh. What would you add to this patient?

A. Acarbose
B. Saxagliptin
C. Empagliflozin
D. Rosiglitazone

Answer: C:

HF (**HFrEF** or **HFpEF**) with/without **DM** → SGLT2-i (Empagliflozin) → it **REDUCES MORTALITY**! Acarbose (α glucosidase-i): will induce edema Saxagliptin (DPP4-i): is the only drug of its class that is C/I in HF RosiGLITAZONE (TZD): the whole class is C/I in HF

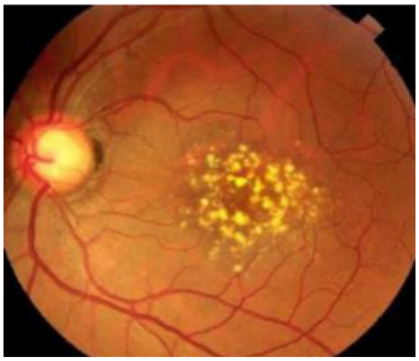
Female, obese, K/C of DM uncontrolled on metformin & glyburide, does NOT want weight gain, what to add?

A. Thiazolidinediones
B. basal insulin
C. bolus insulin
D. SGLT2-i

Answer: **D**

❌ Both insulin types can ↑ Wt
❌ TZD ↑ Wt

54 years old known to have DM, C/O chronic hx of decreased vision, later on he developed central vision loss (I think??), (picture attached)



A. Macular degeneration
B. Ritenal veinus oclossion
C. Ritenal artrey oclossion
D. Close angle glaucoma

Answer: A

DM + **central SCOTOMA** + retinal **DRUSEN** (yellow extracellular debris) = Macular Degeneration

❌ Glaucoma acute (closed-angle): paiFUL (diffuse red eye) + semi-DILATED pupil, corneal clouding + photophobia + ↑IOP

❌ Retinal artery occlusion (CRAO) → cherry red spot

❌ venous occlusion (CRVO) → HEMORRHAGES

A 58-year-old man, diabetic patient complains of an ulcer in his right foot. Physical examination reveals a 1 cm irregular ulceration over the right metatarsal head, surrounded by an area of black gangrenous skin. The patient is admitted for right foot amputation. Which of the following measures would have been most effective in preventing this complication?

A. Doppler examination of the lower extremities
B. Appropriate self-care of feet
C. Neurophysiologic and electromyographic studies
D. Prophylactic treatment with cholesterol-lowering agents

Answer B

❌ Statins are not indicated if the pt is NOT diagnosed with PAD yet! (Regardless of being DM >40, which indicates statin)

❌ Doppler is not preventing vascular disease, it is just DETECT it earlier if indicated

❌ Neurophysiology & EMG studies are not indicated, & not preventing the disease (NO routine screening for PAD) but there is foot exam annually for each DM pt!

Diabetic & HTN patient on meds, his Creatinine 211 µmol/L, GFR 29, what medication to stop?

A. Metformin

B. Sitagliptin
C. Insulin
D. ACE-i

Answer A
- GFR ≤ 30: *STOP* metformin
- GFR 45-30:

○ if the patient was already on metformin → ~continue with caution
○ If not started yet on metformin → NOT recommended to initiate it

❌ Insulin: it is safe to be used in pt with CKD.
❌ ACE-i/ARB can be continued if GFR decline over 4 months is <30% from baseline value
❌ Sitagliptin (DPP4-i): can still be used BUT with renal dose adjustment

Side note : from all DPP4-i, *Linagliptin* is the safest for the kidney & can be used w/o dose adjustment in CKD pts! (Lina → ليّن على الكلى)

A 12-year-old female with type 1 DM, came with generalized abdominal pain, diarrhea nausea & vomiting. She is on basal-bolus insulin, stopped basal, and decreased bolus dose due to not tolerating food. Vitally stable
O/E: moderate dehydrated, diffuse abdominal tenderness
ABG: Ph—7.4, HCO3—20
Na, K—within normal
Urine analysis: +3 glucose, No ketones, no nitrite
what to do?

A. Oral metronidazole
B. Oral glucose with fluid
C. Admission and start insulin infusion
D. Resume insulin and observation

Answer D
She is NOT in DKA or HHS, just resume her chronic Tx.

A 37 year old female diabetes 3 years ago but not controlled despite 3 oral hypoglycaemic. Labs: HbA1c 8.5. Positive islet cells autoantibodies. Positive GAD antibody. What is the most likely diagnosis?

A- Type 1 DM
B- Type 2 DM
C- Maturity onset diabetes of young
D- Latent autoimmune diabetes in adults

Answer: D

Diabetic patient came for follow up on glyburide, metformin and pioglitazone
Labs showed high FBG, HA1C = 9.5 and high creatine of 220 and high Urea. Best management options?

A. Stop metformin and add insulin
B. Stop glyburide and add insulin
C. Stop glyburide and metformin and add insulin
D. Stop pioglitazone and glyburide add insulin

Answer: C

Young male with history of hypoglycemic attacks mainly when he is fasting or exercising improved after eating juice or candies. Labs showed low glucose high insulin level and high C peptide. What is the most likely diagnosis?

A. Insulinoma
B. Exogenous insulin
C. Glucagonoma
D. Factitious SU ingestion

Answer: A

A 25 years old complain of thirst, polyuria and nocturia. You did a urine analysis and found urine osmolality to be <300, you tried a water deprivation test and osmolality hasn't changed, you gave the patient a dose of desmopressin in which after the urine osmolality improved, what is the diagnosis?

A. Diabetes mellitus
B. Nephrogenic diabetes insipidus
C. Central diabetes insipidus
D. Psychological polydipsia

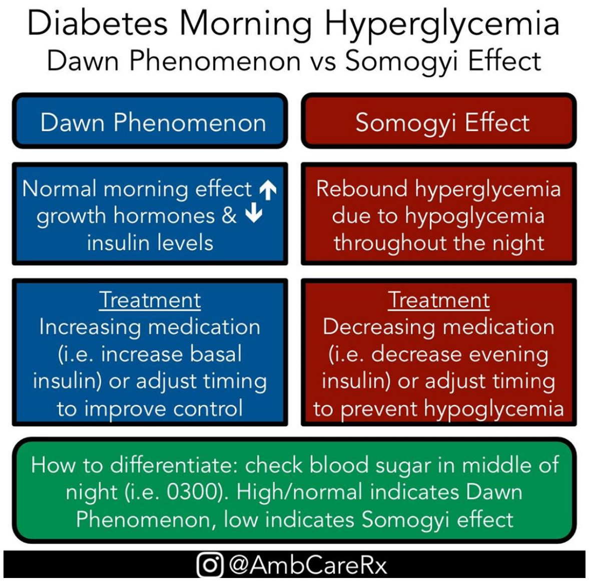
Answer: C

Pt with type 1 Dm on regular insulin 30/70 On monitoring someday he checked his BG at 2 am and it was 3 mmol (there was reading for blood glucose for 3 days in the table but it was not clear) What is the cause ?

A. honeymoon phenomenon
B. Dawn phenomenon

C. Heavy meals
D. Somogyi phenomenon

Answer D



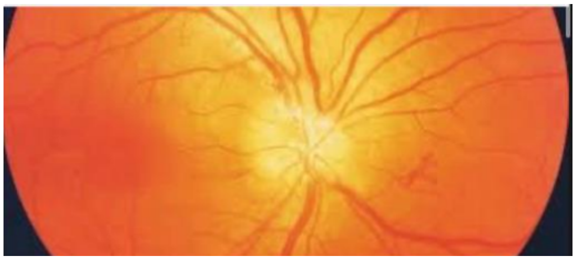
Diabetes Morning Hyperglycemia
Dawn Phenomenon vs Somogyi Effect

Dawn Phenomenon	Somogyi Effect
Normal morning effect ↑ growth hormones & ↓ insulin levels	Rebound hyperglycemia due to hypoglycemia throughout the night
Treatment Increasing medication (i.e. increase basal insulin) or adjust timing to improve control	Treatment Decreasing medication (i.e. decrease evening insulin) or adjust timing to prevent hypoglycemia

How to differentiate: check blood sugar in middle of night (i.e. 0300). High/normal indicates Dawn Phenomenon, low indicates Somogyi effect

@AmbCareRx

Old man with DM -HTN - with progressive visuals problems (blurred vision) over the past months, what the next step



A. artificial tears
B. Vitrectomy
C. Acetazolamide
D. Laser photocoagulation

Answer D

Man with DM and smoker c/o leg pain with walking and standing then it became at rest whit needle and burning sensation , examination showed poor capillary refill and barely palpable peripheral arteries. ABI was 0.4: What is the Dx ?

A. peripheral arterial emboli
B. Chronic arterial insufficiency
C. Peripheral diabetic neuropathy

Answer B

lady with GDM her blood glucose readings goals must be:

A. FBG<100
B. 1hour PPG<180
C. 2 hour PPG <120

Answer C

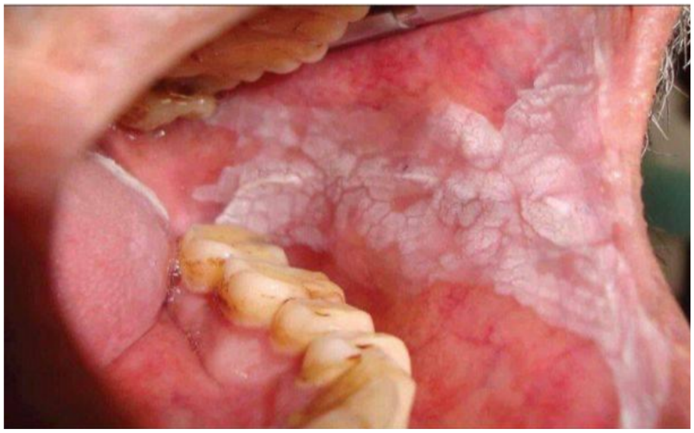
The target glycemic goals for women with GDM is to keep the fasting glucose ≤5-5.3 mmol/l (90-95 mg/dl), and either one-hour post-meal ≤ 7.8 mmol/l (140 mg/dl), or 2-h post-meal ≤ 6.7 mmol/l (120 mg/dl).

Male with hx of DM type 1 presented with vomiting – abdominal pain Labs included HCO3 18, NA 130, No K in Q ,,, What to give?

A. 45 normal saline with insulin
B. Normal saline with insulin
C. 5 % dextrose

Answer B

A 62 years old man comes to the office for follow up of diabetes mellitus type 2. He admits missing his appointment and medications and not following a strict diet. The patient doesn't smoke but has chewed tobacco for many years. He drinks 6-10 bears each weakend. His body mass index is 27.5 kg/m. On oral examination, a while patch is seen on the buccal mucosa. The lesion apears to have a granular texture, is not indurated , and is not removed by scraping with tongue depressor. There is no regional lymphadenopathy. His hemoglobin A1c was 8.5% . Which of the following is the most likely diagnosis ?



A. Aphthous stomatitis.
B. Candidiasis.
C. Herpes simplex virus infection.
D. Leukoplakia
E. Squamous cell carcinoma.

Answer D
(candiasis can be scraped)

A 62-year-old male was recently diagnosed with adhesive capsulitis. Which one of the following is associated with a higher risk of developing adhesive capsulitis compared with the general population?

A. Addison's disease
B. Diabetes mellitus
C. Hyperparathyroidism
D. Hypertension
E. Rheumatoid arthritis

ANSWER: B
According to a 2016 meta-analysis, patients with diabetes mellitus were five times more likely than the control group to have adhesive capsulitis. The same study also found the prevalence of diabetes in patients with adhesive capsulitis to be about 30%. Because of this high prevalence, screening for diabetes with a fasting glucose level or hemoglobin A1c is recommended in patients with adhesive capsulitis who have not previously been diagnosed with diabetes. There is no evidence to support screening for Addison's disease or rheumatoid arthritis in patients with adhesive capsulitis (SOR C). Hyperparathyroidism and hypertension are not associated with adhesive capsulitis.

Which one of the following classes of diabetes medications is most associated with hypoglycemia?

A. Biguanides
B. DPP-4 inhibitors
C. SGLT2 inhibitors
D. Sulfonylureas
E. Thiazolidinediones

ANSWER: D

Multiple classes of diabetes medications are used to address the pathways that lead to hyperglycemia, and it is important to select medication classes that reduce the risk of hypoglycemia while improving long-term outcomes. Hypoglycemia is associated with cardiovascular disease and all-cause mortality. Sulfonylureas, such as glipizide, glyburide, and glimepiride, commonly cause hypoglycemia as an adverse effect and require glucose monitoring when used. Biguanides most commonly cause diarrhea, vomiting, and other gastrointestinal symptoms. In high-risk patients such as those with heart failure, sepsis, or impaired kidney function, biguanides can also result in lactic acidosis. The only biguanide currently available is metformin. The most common adverse effects of DPP-4 inhibitors, which include saxagliptin, sitagliptin, linagliptin, alogliptin, are headache, nasopharyngitis, infections of the urinary tract or upper respiratory tract, and elevated liver enzymes. SGLT2 inhibitors, such as canagliflozin, dapagliflozin, and empagliflozin, can cause adverse effects such as urinary tract infections, candidiasis, dehydration, and hypovolemia. Only two thiazolidinediones, pioglitazone and rosiglitazone, are available in the United States. Their adverse effects include weight gain, salt retention, edema, and, for some patients, cardiovascular complications. Pioglitazone in particular is contraindicated in patients with heart failure, hemodynamic instability, and hepatic dysfunction. Thiazolidinediones may also increase the risk of bone fractures with long-term use.

Which one of the following medications for the treatment of type 2 diabetes has been associated with ketoacidosis?

A. Dapagliflozin (Farxiga)
B. Liraglutide (Victoza)
C. Metformin
D. Pioglitazone (Actos)
E. Sitagliptin (Januvia)

ANSWER: A

SGLT2 inhibitors such as dapagliflozin have increasingly been shown to be associated with diabetic ketoacidosis under certain circumstances. Liraglutide, metformin, pioglitazone, and sitagliptin are not associated with diabetic ketoacidosis.

A 34-year-old gravida 2 para 2 presents for a postpartum examination 6 weeks after an uncomplicated vaginal delivery. Both the mother and infant are doing well. Her only complication during the pregnancy was an abnormal 3-hour glucose tolerance test. She managed her blood glucose with a combination of diet and exercise and delivered at 39 weeks gestation. The patient's vital signs and a physical examination are normal today. Which one of the following should you recommend for this patient based on her history of gestational diabetes?

A. No glucose testing today, and initiation of metformin to prevent diabetes
B. No glucose testing today, and annual screening with a fasting plasma glucose level starting 1 year after delivery
C. No further glucose testing unless she becomes pregnant again
D. A 2-hour plasma glucose level using a 75-g oral glucose load

ANSWER: D

A 2-hour, 75-g glucose tolerance test should be performed at 4–12 weeks post partum following a pregnancy in which gestational diabetes was diagnosed. This will identify patients who have developed diabetes mellitus, impaired fasting glucose, or impaired glucose tolerance. Women who have a history of gestational diabetes have a sevenfold increased risk of developing type 2 diabetes compared to women without a history of gestational diabetes. This patient should not begin taking metformin because she may not be a candidate for treatment. Testing is required to make the diagnosis of diabetes mellitus, impaired fasting glucose, or impaired glucose tolerance. If a patient who was diagnosed with gestational diabetes tests negative for diabetes mellitus on postpartum screening, fasting glucose levels should still be assessed every 1–3 years regardless of pregnancy status. With the next pregnancy the patient should have early screening with a 1-hour glucose tolerance test at the time the pregnancy is confirmed.

The diagnosis of type 2 diabetes can be confirmed by two hemoglobin A1c values at or above a threshold of

A. 5.5%
B. 6.0%
C. 6.5%
D. 7.0%
E. 8.0%

ANSWER: C

The diagnostic cutoff point for type 2 diabetes is a fasting plasma glucose level ≥126 mg/dL or a hemoglobin A1c ≥6.5%. The diagnosis requires confirmation by repeat testing or by obtaining both a fasting glucose level and hemoglobin A1c.

A. Central vision loss with peripheral sparing
B. Halos and decreased night vision
C. Intermittent complete blackening of the visual field
D. Patchy peripheral vision blurring
E. Sudden scattered floaters

ANSWER: D

Glaucoma and other common eye conditions cause a range of visual disturbances. Glaucoma is typically associated with blurring of peripheral vision as elevated pressure in the eye pushes on the periphery of the ophthalmic nerve. Central vision loss with peripheral sparing is classically seen with macular degeneration. Halos

A 67-year-old male presents to your office with a 1-month history of fever with edema and erythema of his right foot. His medical history is significant for peripheral artery disease and poorly controlled type 2 diabetes with diabetic neuropathy. Significant vital signs include a temperature of 38.6°C (101.5°F), a blood pressure of 155/90 mm Hg, and a pulse rate of 85 beats/min. A physical examination is most notable for a draining ulcer on the ball of his right foot. The edema and erythema are limited to his right foot and he has no calf tenderness. Dorsalis pedis and posterior tibial artery pulses are present but diminished at the right ankle. Sensation to monofilament testing of his right foot is diffusely diminished, which is consistent with his baseline.

The best initial imaging test of the foot ulcer would be

A. Radiography
B. Ultrasonography
C. CT
D. MRI
E. technetium 99m bone scintigraphy

ANSWER: A

This patient has osteomyelitis until proven otherwise. A radiograph of his right foot is the best initial test to look for evidence of this diagnosis. In most treatment settings, radiography is much easier to obtain than ultrasonography, CT, MRI, or technetium 99m bone scintigraphy. In addition, it is generally considerably less expensive than the other options listed. A radiograph also allows the physician to rule out other bony pathologies. MRI is useful if the radiograph is inconclusive, and is more helpful than radiography for determining bony versus soft-tissue infection. CT may be used in cases where MRI is contraindicated. Ultrasonography is not useful for evaluating bony lesions. Bone scintigraphy has low sensitivity, particularly in the setting of recent trauma or surgery.

A 67-year-old male with a history of diabetes mellitus, hypertension, and heart failure with reduced ejection fraction has developed stage 5 chronic kidney disease. Which one of the following would be the best option for treatment of his diabetes?

A. Glimepiride (Amaryl)
B. Insulin glargine (Lantus)
C. Metformin

D. Pioglitazone (Actos)

ANSWER: B

Patients with end-stage renal disease and diabetes mellitus need careful monitoring of glucose because insulin requirements are difficult to predict and there is an increased risk of hypoglycemia in this setting. The optimal hemoglobin A1c has not been established but maintaining a value between 6% and 9% does decrease mortality. With close monitoring, insulin is preferred for most individuals. Sulfonylureas such as glimepiride and glyburide are associated with a high risk of hypoglycemia and should be avoided in these patients. Metformin should be avoided in those with a glomerular filtration rate <30 mL/min/1.73 m2. Pioglitazone should also be avoided in chronic kidney disease due to the risk of fluid retention and precipitating heart failure.

A 46-year-old female with known chronic kidney disease presents to discuss treatment of her recently diagnosed type 2 diabetes. She also has long-standing hypertension and her current medications include telmisartan/hydrochlorothiazide (Micardis HCT), amlodipine (Norvasc), and metformin. Her most recent estimated glomerular filtration rate is 52 mL/min/1.73 m2 and her hemoglobin A1c is 7.6%. Her serum electrolytes are all within the normal range. You refer her to a diabetes educator for counseling on self-management and lifestyle modification. Which one of the following is the recommended additional pharmacologic treatment for this patient?

A. Empagliflozin (Jardiance)
B. Glipizide (Glucotrol)
C. Insulin glargine (Lantus)
D. Pioglitazone (Actos)
E. Sitagliptin (Januvia)

ANSWER: A

The American Diabetes Association and the Kidney Disease: Improving Global Outcomes group recommend combination treatment with metformin and an SGLT2 inhibitor for patients with type 2 diabetes and chronic kidney disease (CKD) with an estimated glomerular filtration rate >30 mL/min/1.73 m2. Metformin is first-line medical therapy for the majority of patients with type 2 diabetes. The addition of an SGLT2 inhibitor limits the progression of kidney disease and improves cardiac outcomes (SOR A). They should be considered first-line treatment along with metformin regardless of the baseline or target hemoglobin A1c.

A 55-year-old female with type 2 diabetes, obesity, and hypertension presents for routine follow-up. Despite her best efforts with diet and exercise, she has been unable to achieve a healthy BMI. Her current medications include metformin, lisinopril (Zestril), and atorvastatin (Lipitor). A physical examination is remarkable only for a BMI of 32 kg/m2. A hemoglobin A1c is 7.5%, which is unchanged from 3 months ago. A basic metabolic panel shows normal electrolytes and renal function. Which one of the following additional medications would be most likely to improve her glucose control and help her achieve weight loss?

A. Glipizide (Glucotrol)
B. Insulin glargine (Lantus)
C. Liraglutide (Victoza)
D. Nateglinide (Starlix)
E. Sitagliptin (Januvia)

ANSWER: C

While each of the listed medications has evidence of benefit for improving glycemic control, only the GLP-1 agonist liraglutide would be expected to cause weight loss. SGLT2 inhibitors are also associated with weight loss. Sulfonylureas such as glipizide, insulins such as glargine, and meglitinides such as nateglinide all increase the risk of weight gain. DPP-4 inhibitors such as sitagliptin are weight neutral

A 17-year-old male with a history of type 2 diabetes sees you because of fatigue and a 15-lb weight loss in the past month. The patient reports excessive and frequent urination, thirst, and nausea. His only medication has been metformin, but he states that he stopped taking it 6 months ago. His current weight in your office is 93 kg (205 lb), which confirms the reported weight loss. His blood pressure is 130/78 mm Hg, his pulse rate is 90 beats/min, and his temperature is 37.0°C (98.6°F). A physical examination is otherwise unremarkable. A capillary blood glucose level is 348 mg/dL, a hemoglobin A1c is 11.5%, serum ketones are negative, and a urinalysis shows 3+ glucosuria with concentrated urine but is otherwise normal. Which one of the following would be the most appropriate treatment?

A. Resuming oral metformin
B. Starting oral empagliflozin (Jardiance)
C. Starting subcutaneous insulin
D. Starting subcutaneous liraglutide (Victoza)
E. Hospitalization for continuous intravenous insulin

ANSWER: C

This patient presents with symptomatic hyperglycemia in a catabolic state. In such cases insulin therapy is the most reliable way to control hyperglycemia and reverse catabolism. Oral metformin would not be adequate to control this degree of hyperglycemia and might not be tolerated well, given that the current symptoms include nausea and weight loss. Similarly, both empagliflozin, which increases glucosuria and volume contraction, and liraglutide, which decreases gastric emptying and is likely to exacerbate nausea, are likely to be poorly tolerated in this situation. While rapid and effective treatment is essential to prevent further complications, hospitalization is not necessary since the patient has no evidence of diabetic ketoacidosis.

A 25-year-old primigravida presents at 28 weeks gestation for a routine prenatal visit. She is undecided about breastfeeding versus bottle feeding and asks if breastfeeding provides any benefits for her own health. You advise her that breastfeeding would decrease her risk of later developing

A. colon cancer
B. diabetes mellitus
C. lung cancer
D. osteoarthritis
E. recurrent respiratory infections

ANSWER: B

Breastfeeding provides many health benefits to both the mother and the infant. Maternal benefits include a decreased risk of developing cardiometabolic disease, including diabetes mellitus, hypertension, and cardiovascular disease; a decreased risk of breast cancer and ovarian cancer; and a decreased risk of postpartum depression. A link has not been established between breastfeeding and a reduced risk of developing colon cancer or lung cancer or osteoarthritis later in life. While breastfeeding may reduce the infant's risk of respiratory disease, this is not an expected benefit for the mother.

You see a 26-year-old male who was diagnosed with maturity-onset diabetes of the young at age 22. He has a BMI of 24 kg/m2 and his hemoglobin A1c is now 8.5%. Which one of the following would be most appropriate for this patient?

A. A ketogenic diet
B. Glipizide (Glucotrol)
C. Metformin
D. Short-acting sliding scale insulin with meals
E. Basal insulin at bedtime

ANSWER: B

Maturity-onset diabetes of the young (MODY) is a form of diabetes mellitus in nonobese young adults (under age 30) who have preserved pancreatic -cell function. Nearly 80% of patients with MODY are misdiagnosed as having type 1 or type 2 diabetes. These patients exhibit no signs of insulin resistance (metabolic syndrome, acanthosis nigricans, skin tags, androgenic alopecia), are not obese, have positive C-peptide levels, and have a strong family history of diabetes. MODY does not respond to metformin, but because -cell function is preserved, the hyperglycemia does respond to sulfonylureas. While exercise and a balanced diet of appropriate portions and low carbohydrates are also necessary in patients with MODY, a ketogenic diet is not specifically indicated. Insulin is required only during pregnancy.

Anemia

Collected by: Salem Alshahrani R1
Reviewed by: Faisal Algahtani R2

Anemia is defined as a reduction in one or more of the major red blood cell (RBC) measurements obtained as a part of the complete blood count (CBC): hemoglobin concentration, hematocrit, or RBC count. A low hemoglobin concentration and/or low hematocrit are the parameters most widely used to diagnose anemia. It is one of the common presentations is clinical practice. In many instances the reason of anemia is readily apparent, however it might be challenging to find the reason of anemia in some other cases.
WHO and Cancer Institute defines normal hemoglobin as 14mg/dl for men and 12mg/dl for women. Age, sex, and race are important in the interpretation of normal value. Most laboratories are calibrating the normal range for age and sex.

Approach:

The approach to anemia can be through:

1- Kinetic approach

Decreased RBC production

- Lack of substrate. Iron, Folate, protein
- Marrow disorders/ suppression. Malignancies, fibrosis, Aplasia.
- Decreased trophic hormones. TSH, ACTH
- Chronic illness/inflammation. CRD, RA, SLE and other chronic Conditions.

Increased RBC loss

- Hemolysis – inherited or acquired. G6PD, Autoimmune, transfusion etc.
- Blood loss – occult or obvious.

2- Morphologic approach: more widely used. It depends on RBCs indices, specifically MCV to classify the type of anemia

- **Macrocytic anemia (MCV above 100)**
  - B12 and folate deficiency
  - Acute hemolysis with high reticulocyte count
  - After birth
  - Myelodysplasia. MDS
  - Liver disease
  - Alcohol Abuse
- **Microcytic Anemia (MCV below 80)**
  - Iron deficiency anemia
  - Decreased heme synthesis like in lead poisoning and sideroblastic anemia
  - Decrease globin synthesis like in thalassemia and other hemoglobinopathies
  - Chronic illness and inflammatory illness
- **Normocytic Anemia (MCV 80-100)**
  - Acute hemolysis (G6PD, autoimmune hemolytic anemia and other causes of hemolysis
  - Hypersplenism
  - Anemia of chronic diseases (most common).

Common types:

Iron deficiency anemia:

Is a result of diminished iron store in the body due various reasons including chronic blood loss, nutritional deficiency, and other malabsorption. It is more prevalent in younger children, females at reproductive age and pregnant women.

Megaloblastic anemia:

Is characterized by large size RBCs due vitamin B deficiency, folic acid deficiency, drug or genetic disorders. It is common in elderly, malnourished patient and vegetarians', pernicious anemia, chronic PPI use, use of metformin could lead to vitamin B deficiency anemia. Folic acid deficiency results from alcohol abuse, cancer, and chemotherapy (6-Mercaptopurine).

Sickle cell disease:

It is when glutamic acid is replaced valine at position number 6 in the amino acid sequence at Beta globin unit at the short arm of chromosome number 11. Hemoglobin S is poorly soluble when deoxygenated and it forms polymers that deforms the cell. There is increase in viscosity and endothelial cells and other inflammatory cells are activated causing the vaso-occlusive crisis which is the main reason for the pathology, symptoms and signs of SCD.

Thalassemia:

It is an autosomal recessive transfusion dependent disease.

Beta-thalassemia major happens when beta globin production is totally abolished. In Beta thalassemia intermedia there is a decrease in Beta globin production, and it is not a transfusion dependent. Beta thalassemia minor is a mild disease caused by mutation in 1 beta globin gene

Alpha Thalassemia is classified into 4 types

1.Inheritance of three normal alpha genes (aa/a-) has been termed **alpha thalassemia minima**

2.Inheritance of two normal alpha genes has been termed **Alpha Thalassemia Minor**.

Heterozygous(aa/--) or Homozygous (a-/a-)

3.Inheritance of one normal alpha gene (a-/--) is termed **hemoglobin H (HbH) disease**.

4.Inheritance of no normal alpha genes (--/--) is incompatible with extra uterine life. **Hydrops Fetalis**.

Hemolytic anemia :

Can be due hemoglobinopathies, RBC membrane disorder like Hereditary elliptocytosis (HE) and spherocytosis, G6PD deficiency, and autoimmune hemolytic anemia. There are few other reasons for hemolysis, like infection with malaria, mechanical valves and transfusion. Beside low hemoglobin, Reticulocyte and serum bilirubin are elevated. Autoimmune hemolytic anemia can cause serious illness and even death. It is mostly idiopathic; however, it can be due viruses, drug or other acute infectious or inflammatory illnesses.

Aplastic anemia :

Is a disorder where myeloid progenitor and stem cells are severely diminished or absent in the bone marrow, which leads to pancytopenia. It can be idiopathic, or due to genetic (Fanconi anemia), infections (viruses), Drugs (chloramphenicol, chemotherpy), or radiation.

Assessment:

Careful history and physical examination are crucial to direct the work up for anemia. Age and sex of the patient are important. **Older** population tend get anemia of **chronic disease**, anemia due to blood loss or megaloblastic anemia. Women in the productive age and children tend get iron deficiency anemia.

Patient with anemia may present with, **fatigue, palpitation headache, and shortness of breath, dizziness, blurred vision, orthopnea, or pain.** It is important to know if the patient has any history of anemia in the past, history of chronic medical condition, history of bleeding or history of chronic medical problem like chronic kidney diseases, inflammatory bowel diseases, connective tissue disease or history of cancer.

Red flags like rectal bleeding, weight loss, fever or excessive sweating should be excluded. Family history of hemoglobinopathies like sickle cell disease or thalassemia should be explored. Medication history should be reviewed. Medications like Sulpha drugs, Dapsone , Primaquine and Nitrofuratoin can cause hemolysis in G6PD deficient patient. Chronic use of Metformin and PPI can cause vitamin B12 deficiency and the use of Phenytoin or Methotrexate can cause folate deficiency. It is important to look into the previous investigation of patient. Patient with normal CBC in the past would exclude hemoglobinopathies.

Family history hemoglobinopathies or G6PD deficiency should be explored. Nutritional history including believes and habits is impotent. Vegans and vegetarians and those with psychological eating disorders are prone iron deficiency anemia, B12 and folate deficiency anemia.

It is important to know if the patient had abdominal surgery like bariatric surgery or bowel surgery. Patient with malabsorption problem can suffer from anemia, example is celiac disease

On physical examination, patient with anemia can present with pallor, jaundice (hemolysis), tachypnea, and tachycardia, signs of CHF in severe anemia, chest pain with exertion, nail and hair changes, murmurs, and hepatosplenomegaly. Patient with thalassemia additionally can present dysmorphic features, slow growth, iron overload signs, huge spleen and they are prone to factures and infections. Patient with sickle cell disease may present with acute or chronic manifestations, summarized in table 1.

Table 1: Acute and chronic manifestations of SCD.

	Acute manifestation	**Chronic Manifestation**
Pain	Acute Vaso-occlusive Pain Episodes, Acute Chest Syndrome	Osteonecrosis and ulcers
Infection	Sepsis, pneumonia, meningitis	Osteomyelitis, leg ulcers
Anemia	Aplastic crisis, hemolysis, sequestration	Chronic hypersplenism, Hemolysis
CNS	Stroke, TIA, seizure	Cognitive, growth, behavioral issues
Pulmonary	Acute chest syndrome, PE.	Pulmonary hypertension
Renal	Infarction, Acute renal failure	HTN, chronic renal disease/failure
Skeletal	Dactylitis, Avascular necrosis	Osteomyelitis, osteoporosis
Cardiac	MI, Arrhythmias, sudden deaths	Chronic heart failure
Hepatobiliary	Cholecystitis, cholestasis, sequestration	Gallstone
Ocular	Retinal artery thrombosis, retinaldetachment	Proliferative retinopathy andblindness
Obstetric	Fetal and maternal complication	
GU	Priapism	Erectile dysfunction / infertility
Others	Thromboembolism	Functional Asplenia

Patients who present with other type of hemolytic anemia may present with pallor, fatigue, jaundice. Autoimmune hemolytic anemia is an emergency situation, where patient may present with weakness, fever, chills, dyspnea and heart failure.

Investigations:

It is important to know if the patient had a workup in the past or not. Normal CBC in the past exclude inherited hemoglobinopathies. It is recommended to start with basic work-up according to the history, physical examination, and the differential diagnosis. Using morphologic approach can direct you to the proper and cost-effective work-up.

- **CBC** is the initial step to recognize anemia. CBC indices are important to direct the work-up. MCV is the most important one. RDW can be elevated in iron deficiency anemia. Abnormality in WBC can give some guidance. Leukocytosis can be a sign of infection or inflammation, and severe leukocytosis can be due leukemia. Leukopenia may be a sign of bone marrow suppression or hypersplenism. Platelet count can be elevated in iron deficiency anemia or hemolysis and can be low when bone marrow is suppressed due to infection, aplasia, or malignancy.

- **Blood smear.** Can show the size and morphology of RBCs. Sickled RBCs are often seen in the peripheral smear. You may see spherocytosis or elliptocytosis. In G6PD deficiency, bite cells are seen. You may find high reticulocyte in case of hemolysis. Blast cells are seen in cases of leukemia. In tropical areas, you may find some parasites like malaria or leishmania that can be the cause of anemia.
- **ESR** if inflammatory process like connective tissue disease or malignancy like multiple myeloma are suspected
- **Reticulocyte count** is important to do if you suspect acute hemolysis and in neonatal anemia. Normal or reticulocyte count can exclude hemolytic anemia
- **Iron panel and ferritin.** If iron deficiency anemia is suspected
- **Renal panel,** to assess renal function and exclude chronic kidney disease
- **Liver function test**, elevated Serum Bilirubin can be indicative of hemolysis
- **Sickle cell screening** in you suspect sickle cell disease
- **Hemoglobin electrophoresis** if thalassemia or sickle disease or trait are suspected
- **G6PD** enzyme activity if deficiency is suspected in patient with acute hemolysis
- **Vitamin B12 level, Folate level**. In Macrocytic anemia in patient with suspected deficiencies in folate and vitamin B12
- **RBC antibodies, direct Antiglobulin** (immune mediated hemolysis) if autoimmune hemolytic anemia is suspected
- **Bone Marrow aspiration /Biopsy** might need if the reason for anemia is challenging. Malignancy, myelodysplastic syndrome, or aplasia can be detected. This procedure is done by hematologist

Management:

It is a malpractice is to treat anemia without confirming the diagnosis. Patients shouldn’t be labeled and treated as iron deficient unless their iron panel or ferritin are abnormal
It is important to reach to the diagnosis before starting treatment.

Iron deficiency anemia

Numerous oral iron formulations are available, and all are equally effective, if they were taken. The most appropriate form is a liquid (allows for dose titration) or tablet containing ferrous salts.
Dosing: one Tablet of iron every other day (as a startup , no difference between different formulation of iron pills) . evidence suggests that alternate-day dosing (taking the iron every other day rather than every day) appears to result in equivalent or better iron absorption than daily dosing, usually with fewer adverse effects.
Strategies to improve tolerability:

- Increasing the interval to every other day if not done already.
- Making dietary modifications (taking iron with food or milk
- Switching to a formulation with a lower amount of elemental iron
- Switching from a tablet to a liquid, for which it is easier to titrate the dose.
- Use of a stool softener or bulk-forming laxative .

Monitoring of patients receiving iron replacement depends on the severity of anemia.

For patients receiving oral iron, we often re-evaluate the patient two weeks after starting. We check the hemoglobin and reticulocyte count and review tolerability of the oral iron. Iron is generally given until levels of ferritin and transferrin saturation normalize.

It is important to treat the causing factor of IDA, if GI bleeding is suspected, it is important to refer patient to gastroenterology for possible GI scope. Women with heavy menstrual period should be investigated as well. Patient can be started in oral 60 mg of elemental oral iron daily for a duration of 4-6 months.
Ascorbic acid can be added to enhance absorption. See table 2.

Table 2: Types of oral iron

Generic name	**Tablet dose (elemental iron), mg**	**Elixir dose (elemental iron), mg/5ml**
Ferrous sulfate	325 (65)	300 (60)
	195 (39)	90 (18)
Extended release	525 (105	
Ferrous fumarate	325 (107)	
	195 (64)	100 (33)
Ferrous gluconate	325 (39)	300 (35)
Polysaccharide iron	150 (150)	100 (100)
	50 (50)	

When is parental iron indicated?

IV iron should be considered in patients with confirmed IDA and one or more of the following:
1. Demonstrated intolerance, noncompliance, or lack of efcacy with oral iron, despite modification of dose, timing, and frequency
2. Pregnancy (beyond the first trimester) and postpartum period, for the above reasons or to avoid imminent decompensation/transfusion (e.g., in women who present late and/or have severe anemia)
3. Intestinal malabsorption (e.g., inflammatory bowel disease)
4. Ongoing iron (i.e., blood) losses that exceed absorptive capacity
5. Clinical need for rapid iron supply (i.e., in patients for whom optimization of erythroid response
is essential to prevent physiological decompensation/transfusion)
6. Chronic renal impairment in patients who are receiving concomitant ESA therapy
7. Bariatric surgery

Vitamin B12 deficiency and folic acid deficiency

- Folate deficiency: 1 to 5 mg daily will replete deficiency in 4 to 6 weeks.
  - B12 deficiency: Oral B12 1000 mcg/day or 1000 mcg IM monthly will replete and maintain B12. Oral B12 is as effective as monthly IM administration in patients withor without the intrinsic factor.

Sickle cell disease

Hydration and keeping good room temperature is important. Pain control with the appropriate analgesia like NSAIDs , Paracetamol or Opioid when needed . Treating sickle cell pain with long-acting opioids decreases hospital admissions and emergency room use; oral opioids are preferred to IV opioids.

Management of sickle disease crisis

- **For painful crisis** Strong **opioids** should be offered within 30 minutes of presentation for patients with a severe acute painful sickle cell episode. If pain continue with the same severity after 30 minutes, another bolus of strong opioid can be given. Consider **patient-controlled analgesia** if repeated doses of a strong opioid are needed over two hours (NICE guideline). Laxatives, anti-emetics and antipruritic can be used as needed. Oral controlled-release morphine provides a safe and effective alternative to continuous IV morphine. Very close monitoring of side effect is very important. Patient will need hourly monitoring initially for the first 6 hours.

— **Hydroxyurea** appears to be safe and effective for patients with severe Hb-SS disease and is indicated for patients who have 3 or more painful episodes per year and who have sickle cell complications. **Folic acid** supplement as long term is indicated. Patient with sickle disease needs psychological support and may benefit cognitive behavioral therapy.

— **Blood transfusions** are used to treat and prevent complications of SCD, including preparation for surgery; treatment of symptomatic anemia, acute stroke, multiorgan failure, and acute chest syndrome; and prevention of stroke, acute chest syndrome, and recurrent priapism.

- **Sequestration Crisis** is managed as an emergency with blood transfusion. Splenectomy at an appropriate point in time shall be performed to reduce the risk of recurrence and. Mortality.
- **Aplastic crisis** can happen due to Parvovirus B19, or other infection. There is severe drop in hemoglobin and reticulocyte count. Blood transfusion is needed until spontaneous recovery of bone marrow with 2-14 days (reappearance of reticulocyte in the peripheral smear)
- **Acute chest syndrome (ACS)** is the second cause of hospitalization after painful crisis in SCD patients. ACS is managed as an emergency, by giving the appropriate analgesia of painful crisis. Keeping O2 saturation above 92% using the appropriate oxygenation method and intensive spirometry. Use of bronchodilator and a short course of corticosteroid for those who wheeze or have Asthma. Broad spectrum antibiotic coverage is recommended. (Third generation cephalosporin and a Macrolide for atypical organism). Blood transfusion is recommended in severe cases of ACS and in patients who continue to have drop in their hemoglobin despite adequate treatment.
- **Immunizations strep. Pneumoniae, Neisseria meningitidis, H influenza B, Hepatitis B and viral influenza** is critical to avoid infections.
- **Prophylaxis**: Children between 3 months to 3 years requires Penicillin V 125 mg BID and children between ages 3-5 years require 250 mg bid as a prophylaxis. After the age of 5 prophylaxis is controversial.

Thalassemia major

It is treated with regular blood transfusion. In many cases splenectomy is required to reduce the frequency of transfusion. Because of repeated transfusions, iron overload requires Chelation Therapy with **Desferrioxamine**. All patient with thalassemia will require folic acid supplement. Beta Thalassemia intermedia and HBH may require transfusion in certain individual. Iron Chelation therapy is initiated with certain criteria that includes number of transfusions, ferritin level, and liver iron content. Allogeneic bone marrow transplant to cure patient if there is HLA matched sibling or matched unrelated donor. Gene therapy is currently under trails. All post-splenectomy patients should receive **Haemophilus Influenza, Meningococcal, and the Pneumococcal 23 valent polysaccharide (PPSV23) vaccines** prior to surgery. The PPSV23 vaccine should be repeated 3 to 5 years later. They should also receive **Influenza vaccination** annually.

Autoimmune hemolytic anemia

Warm type WAIHA is treated with steroids with or without rituximab and transfusions, even if the blood is incompatible. Second-line treatment options include rituximab; cyclophosphamide, danazol, or cyclosporin

and azathioprine or splenectomy.
Cold agglutinin disease is treated with steroids although treatment failure is common. Other treatments include rituximab, interferon, or alkylating agents.

Hereditary Spherocytosis/ Elliptocytosis

Splenectomy is indicated if there is a need for repeated transfusion, risk of hemosiderosis or if anemia is persistent. it is not indicated below the age of 6. There is strong evidence to suggest benefit of laparoscopic over traditional splenectomy, and of near-total splenectomy over total splenectomy. Immunization against capsulated organism is indicated post splenectomy.

Aplastic Anemia

Hematopoietic cell transplantation (HCT) is curative therapy. Immunosuppression with anti- thyroid globulins in combination with cyclosporine is the treatment of choice in patients who are not candidates for HCT.

Anemia
MCQs

ABFM 2022

A 27-year-old male presents to establish care after relocating to the community. He was diagnosed with a β-thalassemia major at birth and has been transfusion-dependent since early childhood. His microcytic anemia is stable with blood transfusions every 4 weeks, but his most recent DEXA scan indicates an advancement from osteopenia to osteoporosis. In addition to bisphosphonates, calcium, and vitamin D, which one of the following medications may improve his bone density?

A. Hydroxyurea (Hydrea)
B. Vitamin C
C. Zinc
D. Deferoxamine (Desferal)
E. Luspatercept (Reblozyl)

Answer C

In addition to bisphosphonates, calcium, and vitamin D, zinc supplementation is recommended to improve bone density in patients with thalassemia and osteoporosis (SOR C). Though hydroxyurea is an indicated therapy to minimize the frequency of blood transfusions needed in transfusion-dependent thalassemia, it does not improve bone density (SOR C). Vitamin C supplementation does not improve bone health in patients with thalassemia and osteoporosis. Deferoxamine infusions are indicated when ferritin levels are >1000 ng/mL in patients with transfusion-dependent thalassemia to reduce iron overload (SOR C). Luspatercept reduced transfusion burden by 33% in phase 3, a randomized study but is not indicated to improve bone density.

A 72-year-old male presents for follow-up of a recent emergency department (ED) visit for chest pain that was diagnosed as costochondritis. He has a history of hypertension and chronic atrial fibrillation. A CBC in the ED was significant for a hemoglobin level of 11.1 g/dL (N 13.5–17.5) and a mean corpuscular volume of 104 µm3 (N 80–100). Follow-up laboratory studies showed the following:
Peripheral smear----------------------------normal other than macrocytosis
Reticulocyte index--------------------------1.7% (N 0.5–2.5)
Vitamin B12 ---------------------------------512 pg/mL (N 190–950)
Folate--12 pg/mL (N 2.7–17)
Which one of the following is the most likely cause of this patient's anemia?

A. Anemia of chronic disease
B. Chronic alcohol use
C. Gastrointestinal bleeding
D. Hemolysis
E. Myelodysplastic syndrome

Answer B
Chronic alcohol use is one of the most common causes of macrocytic anemia. This patient's normal peripheral smear and reticulocyte index <2% in the setting of anemia suggest decreased red blood cell production, which may be related to alcohol use or nutritional deficiency. Vitamin B12 and folate levels in the normal range rule out deficiencies in these vitamins, though patients with low-normal vitamin B12 and folate levels may warrant testing of homocysteine and methylmalonic acid levels. Anemia of chronic disease is typically characterized by a normocytic or microcytic anemia and a low reticulocyte count. Blood loss and hemolytic anemia are typically associated with a reticulocyte index >2%. Myelodysplastic syndrome is not suggested by the peripheral smear and is less common than anemia related to alcohol use disorder.

A 74-year-old male whom you have not seen for several years presents with fatigue, an 8-lb weight loss, and musculoskeletal pain for the last 6 months. He had been in good health before these symptoms started. He states that he has a "deep ache" in his lower back, hips, and shoulders that awakens him at night. Plain films of the lumbar spine ordered by an orthopedic surgeon revealed osteopenia and degenerative disease with osteophytes. A bone scan was within normal limits for his age. The only abnormalities you detect on a thorough physical examination are tenderness to percussion over the scapulae, lumbar vertebrae, and posterior pelvis, and a mildly enlarged but smooth prostate. Laboratory Findings
Hematocrit -------------------------------31% (N 40–50)
Hemoglobin ------------------------------10.3 g/dL (N 14.0–17.0)
Mean corpuscular volume------------90 µm3 (N 80–100)
PSA---4.6 ng/mL (N 0.0–4.0)
Calcium-----------------------------------10.9 mg/dL (N 9.0–10.5)
Phosphorus------------------------------4.2 mg/dL (N 3.0–4.5)
Albumin----------------------------------3.0 g/dL (N 3.5–5.5)
Globulin----------------------------------6.7 g/dL (N 2.0–3.5)
Alkaline phosphatase-----------------86 U/L (N 30–92)
BUN---------------------------------------26 mg/dL (N 8–20)
Creatinine-------------------------------2.5 mg/dL (N 0.7–1.5)
Of the following, the most likely diagnosis is

A. Carcinoma of the prostate metastatic to bone
B. Hyperparathyroidism
C. Multiple myeloma
D. Osteomalacia
E. Oolymyalgia rheumatica

ANSWER: C
The combination of a high globulin-to-albumin ratio, anemia, renal insufficiency, and hypercalcemia in a patient with diffuse musculoskeletal pain is highly suggestive of multiple myeloma. Serum and urine immunoelectrophoresis would be the next test to order. Carcinoma of the prostate metastatic to bone should be seen on a bone scan and the PSA level would be much higher. Hyperparathyroidism is part of the differential diagnosis, but a low phosphorus level would be expected. An elevated alkaline phosphatase level would be expected in osteomalacia. Polymyalgia rheumatica is more common in women and would not be associated with elevated calcium and globulins and this degree of anemia.

ABFM 2021

Which of the following is the most common cause of koilonychia (spoon shaped nails)?

A. Chronic pulmonary disease
B. Hypertension
C. Iron def anemia
D. Onychomycosis
E. Psoriasis

Answer C

ABFM 2020

Which one of the following oral iron preparations is most effective for the treatment of iron deficiency anemia in a patient with non–dialysis-dependent chronic kidney disease?

A. Ferric citrate (Auryxia)
B. Ferrous fumarate
C. Ferrous gluconate
D. Ferrous sulfate

ANSWER: A
Oral iron supplements, including ferrous fumarate, ferrous gluconate, and ferrous sulfate, are generally

ineffective when used by hemodialysis patients and are only modestly effective when used by patients with non–dialysis-dependent chronic kidney disease. The one exception is ferric citrate, which is highly efficacious in all patients with chronic kidney disease. Intravenous iron preparations such as iron dextran are similarly effective in both groups and are considered the gold standard for the treatment of iron deficiency in patients on chronic hemodialysis.

A 68-year-old female with a history of diabetes mellitus, hypertension, and heart failure with preserved ejection fraction presents with a long-standing diabetic foot ulcer. The patient reports no signs of any gastrointestinal bleeding, no blood in her urine, no bleeding gums, and no vaginal bleeding. Her medications include metformin (Glucophage), insulin glargine (Lantus), lisinopril (Prinivil, Zestril), atorvastatin (Lipitor), and furosemide (Lasix).
A CBC reveals a WBC count of 7600/mm3 (N 4500–11,000), a hemoglobin level of 9.7 g/dL (N 14.0–17.5), a mean corpuscular volume of 89 m3 (N 80–100), and a platelet count of 412,000/mm3 (N 150,000–400,000).
To further assess the patient's anemia you obtain the following laboratory results:
Ferritin--293 ng/mL (N 22–275)
Serum iron---43 g/dL (N 50–175)
Transferrin--190 mg/dL (N 177–264)
Reticulocyte count---3.2% (N 0.5–1.5)
Vitamin B12--564 pg/mL (N 230–1050)
Haptoglobin---198 mg/dL (N 63–273)
Which one of the following is the most likely cause of her anemia?

A. Anemia of chronic disease
B. Bone marrow suppression
C. Hemolysis
D. Iron deficiency
E. Vitamin B12 deficiency

ANSWER: A
This patient has findings most consistent with anemia of chronic disease, also known as anemia of inflammation. This condition is thought to be primarily a disorder of iron distribution in response to systemic inflammation, which also biases hematopoiesis toward myeloid cell production rather than erythropoiesis and shortens the erythrocyte lifespan. Anemia of chronic disease is a normocytic and normochromic anemia. Iron studies typically show evidence of iron restriction without systemic iron deficiency. A common challenge in diagnosis is when true iron deficiency coexists with anemia of chronic disease.

ABFM 2019

Which one of the following is the most common cause of iron deficiency anemia in premenopausal women?

A. Blood donation
B. Peptic ulcer disease
C. Hematuria
D. Abnormal uterine bleeding

E. Colon cancer

ANSWER: D

Abnormal uterine bleeding is the most common cause of iron deficiency anemia in premenopausal women, accounting for 20%–30% of cases. Gastrointestinal causes are less common but should be considered if the gynecologic evaluation is normal or the anemia fails to resolve with iron supplementation. Blood donation and hematuria are less common causes.

A 45-year-old African-American male with a several-month history of fatigue and anorexia with weight loss is found to be anemic, with a hemoglobin level of 9.2 g/dL (N 14.0–18.0). Which one of the following microscopic findings on a peripheral blood smear would be most characteristic of vitamin B12 deficiency anemia in this patient?

A. Microcytic, hypochromic RBCs
B. Crescent- or sickle-shaped RBCs
C. Basophilic stippling of RBCs
D. Hypersegmented polymorphonuclear WBCs
E. Schistocytes

ANSWER: D

Vitamin B12 deficiency, which is most commonly related to a deficiency of intrinsic factor that is produced by the gastric mucosa and is necessary for absorption of vitamin B12in the terminal ileum, is manifested as a megaloblastic macrocytic anemia. In addition to an elevated mean corpuscular volume, the classic finding on microscopy of the peripheral smear is the presence of multiple (usually five or more) segments in the WBC nuclei. Vitamin B12 levels are low and a high methylmalonic acid level helps to confirm the diagnosis. A methylmalonic acid level is recommended in patients who have borderline low vitamin B12levels but are at risk for deficiency. Risk factors include chronic proton pump inhibitor use; chronic metformin therapy; chronic malnutrition due to alcoholism, chronic gastritis, or peptic ulcer disease; and diseases of the terminal ileum, such as Crohn’s disease. People who have had gastric bypass surgery are also at risk for vitamin B12 deficiency, which is why supplementation should be provided in these patients.

ABFM 2015-2018

You have prescribed oral iron replacement for a 46-year-old female with iron deficiency anemia related to heavy menses. She wants to be sure that the iron she takes will be absorbed well. Which one of the following would you suggest for improving iron absorption?

A. Calcium
B. Vitamin C
C. Coffee
D. Tea

Answer B

A 16-year-old female is brought to your office by her mother, who is concerned that her daughter has seemed tired lately. The patient denies any specific health concerns or recent illnesses. She is taking an oral contraceptive and reports that her menstrual bleeding is light in flow. Recent laboratory findings include a TSH level of 1.44 :U/mL (N 0.5–5.0), a hematocrit level of 38% (N 36–46), a mean corpuscular volume of 71 :m3 (N 78–102), an RBC count of 5.7 million/mm3 (N 4.10–5.10), and ovalocytes on a peripheral smear.
Which one of the following is most likely to explain this patient's initial laboratory abnormalities and lead to a diagnosis?

A. A vitamin B12 level
B. A ferritin level
C. A free T4 level
D. Hemoglobin electrophoresis
E. A fluorescent spot test

ANSWER: D
This presentation is consistent with alpha-thalassemia minor trait in a generally asymptomatic patient. Hemoglobin electrophoresis will be abnormal, with HbA2 increased and HbA decreased. The free T4 level is likely to be normal in a patient with a normal TSH level. A ferritin level is also likely to be normal given the normal levels of hemoglobin and hematocrit. A fluorescent spot test is used to screen for G-6-PD deficiency, which would be associated with bite cells and Heinz bodies. A vitamin B12 level would be useful for evaluating macrocytosis, which is not present in this patient

A 30-year-old female with hyperthyroidism is treated with methimazole (Tapazole). Which one of the following is a potential adverse reaction?

A. Agranulocytosis
B. Aplastic anemia
C. Thrombocytopenia
D. Ototoxicity
E. Renal toxicity

ANSWER: A
Agranulocytosis occurs in about 1 in 500 patients who are taking methimazole. Prior to starting therapy the patient should be advised to be alert for a fever and severe sore throat. A recent survey showed that 61% of patients were unaware of potential adverse reactions. Another serious reaction is hepatotoxicity.

A 66-year-old male is diagnosed with monoclonal gammopathy of undetermined significance. This patient will require regular follow-up visits because of the risk his condition will progress to:

A. aplastic anemia
B. multiple myeloma
C. chronic lymphocytic leukemia
D. acute myelogenous leukemia
E. idiopathic thrombocytopenic purpura

ANSWER: B

Monoclonal gammopathy of undetermined significance (MGUS) is present in approximately 2%–3% of the white population older than 50. It is associated with a risk of progression to multiple myeloma at a rate of 1% per year. Most patients diagnosed with MGUS should be reevaluated in 6 months with a medical history, physical examination, CBC, calcium and creatinine levels, and serum electrophoresis, and then annually thereafter.

A 45-year-old premenopausal female with a BMI of 34.0 kg/m2 presents to your office with increasing dyspnea on exertion. She has a recent history of iron deficiency anemia and wonders if her iron level is low again. Her history is negative for heavy menses, bloody or melanotic stools, abdominal pain, and unusual bleeding or bruising. Her evaluation for anemia has included upper and lower endoscopy with normal findings. Last year the patient underwent gastric bypass surgery and has been on a fairly restricted diet since that time. She uses a levonorgestrel IUD (Mirena) for contraception.

A physical examination is unremarkable. Her serum ferritin level is 6 ng/mL (N 10–120) and her hemoglobin level is 8.0 g/dL (N 12.0–16.0) with microcytic indices. You determine that she has iron deficiency anemia.

Which one of the following would be the most appropriate management?

A. Oral iron replacement
B. Intravenous iron replacement
C. Blood transfusion
D. Urgent referral to a hematologist

ANSWER: B

This patient has symptomatic iron deficiency anemia. Because she has had a gastric bypass, she is not able to absorb iron adequately and therefore needs intravenous iron replacement. A blood transfusion may help temporarily but will not restore her iron stores, so it is not indicated. She will not absorb oral iron adequately. If she does not respond to intravenous iron, consultation with a hematologist may be indicated.

You have diagnosed a 32-year-old female with moderate iron deficiency anemia, presumed to be due to chronic menstrual blood loss. She has no gastrointestinal or genitourinary symptoms, and no bruising or bleeding other than menstrual bleeding. Her vital signs are normal, and a physical examination is unremarkable. You initiate a trial of oral iron therapy.

Which one of the following would be the best way to assess the patient's response to oral iron?

A. A reticulocyte count in 1–2 weeks

B. A repeat hematocrit in 2 weeks
C. A peripheral smear to look for new RBCs in 4 weeks
D. A serum total iron binding capacity and ferritin level in 6 weeks

ANSWER: A

The reticulocyte count is the first and best indicator of iron absorption and bone marrow response to oral iron therapy in the treatment of iron deficiency anemia. An increase in reticulocytes is seen as early as 4 days, peaking at 7–10 days. The rate of production of new RBCs slows thereafter due to a compensatory decrease in erythropoietin as more iron becomes available. It typically takes 4–6 weeks before seeing recovery in the hematocrit, and for the RBC count and indices to normalize. However it is usually 4–6 months before iron stores are fully restored to normal levels, so treatment should continue for at least that long.

A 48-year-old female with GERD treated with a proton pump inhibitor for the past 2 years sees you for a routine visit. She reports that she has paresthesia and numbness in both feet. Her hemoglobin A1c is 5.8%, her hemoglobin level is 10.4 g/dL (N 12.0–16.0), and her mean corpuscular volume is 102 m3 (N 81–99). Microfilament testing shows decreased sensation in both feet.
Which one of the following is the most likely cause of her peripheral neuropathy?

A. Charcot-Marie-Tooth disease
B. Diabetic peripheral neuropathy
C. Hyperthyroidism
D. Tarsal tunnel syndrome
E. Vitamin B12 deficiency

ANSWER: E

This patient has polyneuropathy, macrocytic anemia, and a history of chronic proton pump inhibitor use. The most likely cause is vitamin B12 deficiency and a serum level is indicated. Her hemoglobin A1c is 5.8%, which puts her at risk of developing diabetes mellitus but is not indicative of diabetes. Charcot-Marie-Tooth disease is a rare cause of polyneuropathy and unlikely in this case. Hypothyroidism, and not hyperthyroidism, is associated with polyneuropathy. Tarsal tunnel syndrome causes a mononeuropathy.

A 65-year-old male brings in results from a health fair screening. He was advised to see you because he had a hemoglobin level of 10.2 g/dL (N 14.0–18.0) and a mean corpuscular volume of 80 m3 (N 80–94). A review of systems is unremarkable except for recent fatigue, and a physical examination is also unremarkable. You order laboratory testing, with the following results:
Ferritin --------------------------------15 ng/mL (N 20–150)
Vitamin B12 ------------------------- 420 pg/mL (N 200–900)
Folate --------------------------------- 12 ng/mL (N 2–20)
Reticulocyte index ------------------0.3% (N 0.5–1.0)
The most likely diagnosis is?

A. iron deficiency anemia

B. vitamin B12 deficiency
C. anemia of chronic disease
D. hemolysis
E. myelodysplastic anemia

ANSWER: A

This patient most likely has iron deficiency anemia. The low normal mean corpuscular volume, low serum ferritin, and low reticulocyte index are all consistent with iron deficiency. Vitamin B12 deficiency would be indicated by low vitamin B12 and a macrocytic anemia. Serum ferritin would be higher with anemia of chronic disease and myelodysplastic anemia. The reticulocyte index would be high with hemolysis.

Part 1 2021

Female Patient known case of DM on metformin came for evaluation for her numbness , absent ankle reflex , positive Babinski sign , with anemia , her MCV 106 What most likely diagnosis ?

A. Vitamin B12 deficiency
B. Hypothyroidism
C. Peripheral neuropathy
D. Folate deficiency

Answer A

Part 2019

On a routine-screening: complete blood count, a 7-year-old is noted to have a microcytic anemia. A follow-up hemoglobin electrophoresis demonstrates an increased concentration of hemoglobin A2 7% .
What is the most likely diagnosis:

A. Alpha-thalassemia trait
B. β-thalassemia trait
C. Iron deficiency anemia
D. Sickle cell anemia

Answer B

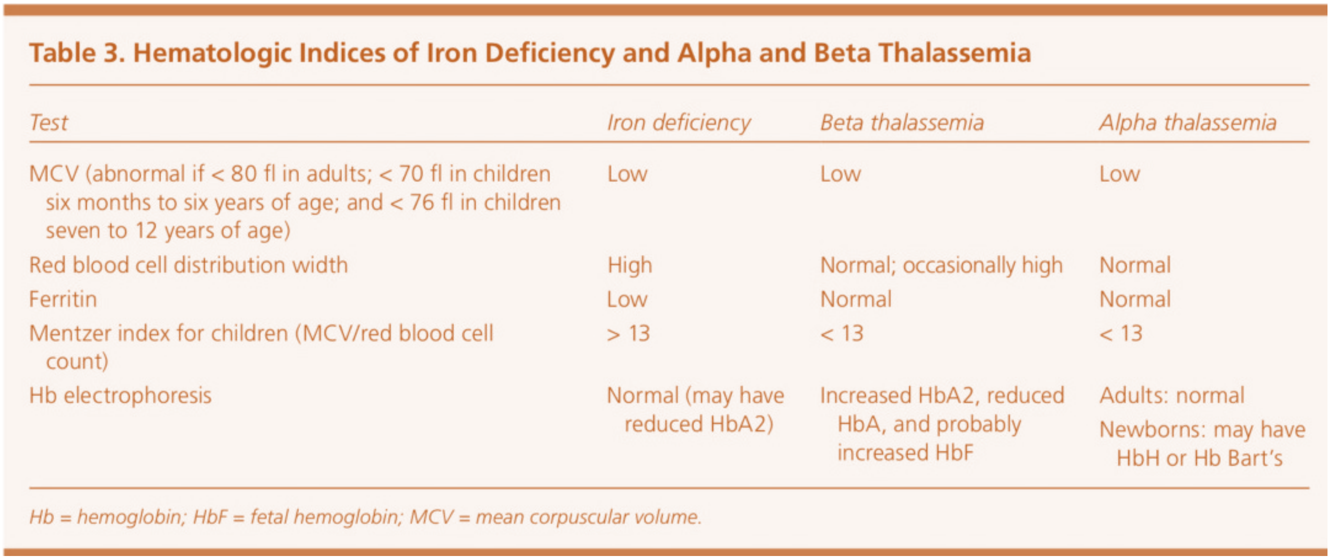


Table 3. Hematologic Indices of Iron Deficiency and Alpha and Beta Thalassemia

Test	*Iron deficiency*	*Beta thalassemia*	*Alpha thalassemia*
MCV (abnormal if < 80 fl in adults; < 70 fl in children six months to six years of age; and < 76 fl in children seven to 12 years of age)	Low	Low	Low
Red blood cell distribution width	High	Normal; occasionally high	Normal
Ferritin	Low	Normal	Normal
Mentzer index for children (MCV/red blood cell count)	> 13	< 13	< 13
Hb electrophoresis	Normal (may have reduced HbA2)	Increased HbA2, reduced HbA, and probably increased HbF	Adults: normal Newborns: may have HbH or Hb Bart's

Hb = hemoglobin; HbF = fetal hemoglobin; MCV = mean corpuscular volume.

Promotion 2022

Elderly healthy and asymptomatic for routine check-up. Labs normocytis anaemia. What to do next?

A. Ferritin level
B. Peripheral smear
C. Iron supplements
D. Hb electrophoresis

Answer: A

KFMC mid year 2021

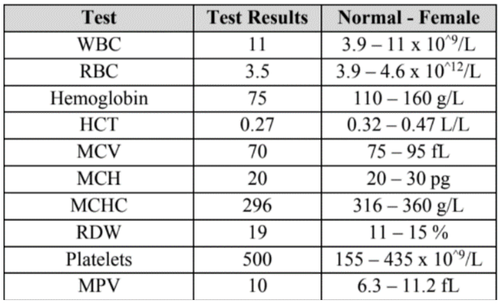
Which of the following microscopic finding on a peripheral blood smear would be most characteristic of vitamin B12 deficiency anemia?

A. Microcytic, Hypochromic RBCs
B. Macrocytic RBCs
C. Sickle-shaped RBCs
D. Basophilic stippling of RBC

ANSWER: B

Central region mid year 2019

A 32-year-old female came to the clinic complaining of tiredness, palpitations and dizziness for the last few months. She has also been feeling breathless on exertion, but she denied any chest pain, cough or wheeze. The patient is known case of bronchial asthma controlled on Ventolin as needed. And she just delivered her first child 6 months back. Her blood tests results are shown below:



Test	Test Results	Normal - Female
WBC	11	3.9 – 11 x $10^{\wedge 9}$/L
RBC	3.5	3.9 – 4.6 x $10^{\wedge 12}$/L
Hemoglobin	75	110 – 160 g/L
HCT	0.27	0.32 – 0.47 L/L
MCV	70	75 – 95 fL
MCH	20	20 – 30 pg
MCHC	296	316 – 360 g/L
RDW	19	11 – 15 %
Platelets	500	155 – 435 x $10^{\wedge 9}$/L
MPV	10	6.3 – 11.2 fL

What's the most likely cause for her symptoms?

a. Macrocytic anemia
b. Beta thalassemia trait
c. Iron deficiency anemia
d. Anemia of chronic illness

Answer C

Pretest 4th edition

You are caring for a patient who reports fatigue. A laboratory analysis reveals a microcytic anemia with a hemoglobin level of 9.9 g/dL. The red cell distribution width (RDW) is elevated. Which of the following is the best treatment plan?

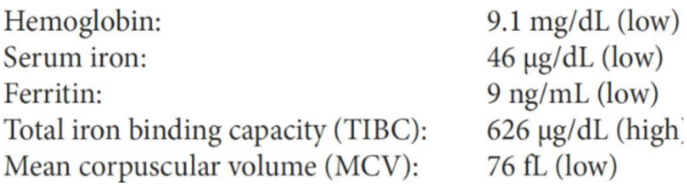
A. Start erythropoietin
B. Treat with vitamin B12 injections weekly for 1 month and then monthly
C. Treat with ferrous sulfate 325 mg twice daily
D. Treat with elemental iron 325 mg once daily
E. Consider a bone marrow biopsy

Answer C

Anemias can often be classified by cell size. Causes of microcytic anemias include iron deficiency, anemia of chronic disease, thalassemia, and sideroblastic anemias. In iron deficiency, the RDW would be elevated due to variation in cell size. Vitamin B12 deficiency causes a macrocytic anemia not a microcytic anemia. In thalassemia, the RDW would be normal because the red cells are uniformly small. Aplastic anemia and anemia due to chronic renal insufficiency are generally normocytic. In a patient with mild to moderate microcytic anemia due to iron deficiency, a trial of iron therapy is indicated. Iron comes in 224 various preparations including ferrous sulfate, gluconate, or fumarate. Up to 180 mg of elemental iron can be given daily; 300 mg of ferrous sulfate is equivalent to 60 mg of elemental iron while 300 mg of ferrous gluconate contains 34 mg of elemental iron daily.

Erythropoietin is useful to treat anemia of chronic disease and B12 supplementation is indicated in B12 deficiency, but not iron deficiency. A bone marrow biopsy is not indicated in a stable patient with mild iron-deficiency anemia.

A 60-year-old man is being evaluated for fatigue, weakness, and exercise intolerance.
Laboratory assessment reveals:



Hemoglobin:	9.1 mg/dL (low)
Serum iron:	46 μg/dL (low)
Ferritin:	9 ng/mL (low)
Total iron binding capacity (TIBC):	626 μg/dL (high
Mean corpuscular volume (MCV):	76 fL (low)

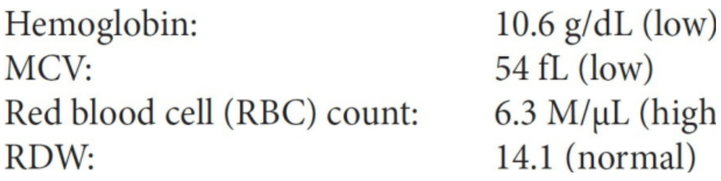
What is the most common cause of this condition?

A. Blood loss
B. Poor nutrition
C. Inadequate absorption of iron
D. Chronic disease
E. Folic acid deficiency

Answer A

The laboratory evaluation in this patient clearly indicates iron-deficiency anemia. The most common cause is blood loss. Poor nutrition and/or inadequate absorption are less common causes. In females, menstrual blood loss is an important cause of iron-deficiency anemia. Chronic disease would lead to a high or normal ferritin and a low TIBC. Folic acid deficiency would lead to an elevated MCV.

You are performing a presurgical clearance evaluation on a 44-year-old otherwise healthy African-American man who is undergoing a laparoscopic cholecystectomy. His CBC is shown below:



Hemoglobin:	10.6 g/dL (low)
MCV:	54 fL (low)
Red blood cell (RBC) count:	6.3 M/μL (high
RDW:	14.1 (normal)

What is the most appropriate step prior to surgery?

A. Oral iron replacement for 4 weeks, then recheck before surgery
B. Parenteral iron replacement for 4 weeks, then recheck before surgery
C. Transfusion
D. Hemoglobin electrophoresis

E. Erythropoietin

Answer D

The patient described has a laboratory profile suspicious for thalassemia minor. These patients have low hemoglobin and MCV, but in contrast to iron deficiency, the patients have an elevated RBC and normal RDW. Additionally, the MCV is low out of proportion to the anemia. Given that the patient is asymptomatic, he should be treated only if necessary. Iron supplementation should be avoided as it can lead to iron overload. Treatment includes transfusion if blood loss leads to significant anemia. The patient should have genetic counseling if planning a family.

You are evaluating a 26-year-old woman with fatigue. She also complains of light- headedness and paresthesias in her hands and feet. On examination, her vital signs are normal, but you note pallor and glossitis. Laboratory evaluation reveals a hemoglobin of 9.8 g/dL (L) and an MCV of 102 fL (H). Which of the following would be the most likely to treat her condition?

A. Diet rich in green leafy vegetables
B. Diet rich in iron
C. Vitamin B12 supplementation
D. Folic acid supplementation
E. Iron supplementation

Answer C

Some clinical features are common to all megaloblastic anemias— anemia, pallor, weight loss, fatigue, and glossitis to name a few. Neurologic symptoms are specific to vitamin B12 deficiency. Typically, treatment has been with parenteral vitamin B12 replacement weekly for 1 month, often with concurrent administration of folic acid. However, recent studies have shown that oral replacement of vitamin B12 at levels of 1000 to 2000 mgc daily is equivalent to IM treatment.

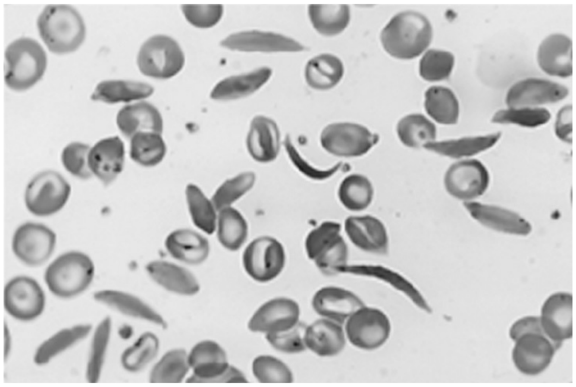
A 68-year-old man complains of fatigue. He has a history of hypertension, well- controlled with hydrochlorothiazide. He has recently lost 30 lb on a high-protein, low- carbohydrate diet. He drinks 2 to 3 beers daily, and smokes 10 cigarettes daily. Laboratory evaluation reveals a macrocytic anemia and vitamin B12 deficiency. Which of the following is the most likely cause?

A. Side effects of hydrochlorothiazide
B. High-protein diet
C. Low-carbohydrate diet
D. Alcohol intake
E. Inadequate vitamin B12 absorption

Answer E

Most often, vitamin B12 deficiency is a result of inadequate absorption. Since vitamin B12 is present in all animal products, only strict vegans or people not ingesting animal products would be deficient from a dietary standpoint. Vitamin B12 deficiency is not a side effect of hydrochlorothiazide. Alcohol can impact intracellular processing of folic acid, but not vitamin B12

A 3-year-old African-American boy is brought in by his parents with inconsolable crying. He reports extreme pain in his hands and upper extremities. Laboratory evaluation reveals a hemoglobin of 8.2 mg/dL. His peripheral blood smear is shown as follows:



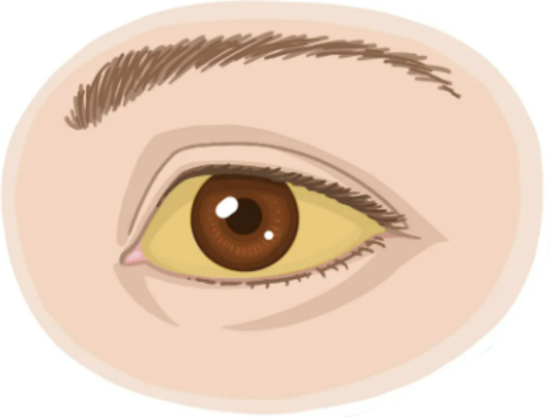
sa

Which of the following measures would be the most likely to reduce these events in the future?

A. Chronic use of analgesics
B. Adequate hydration
C. Immunization against streptococcal pneumonia
D. Monthly transfusions
E. Daily penicillin prophylaxis until the age of 5 years

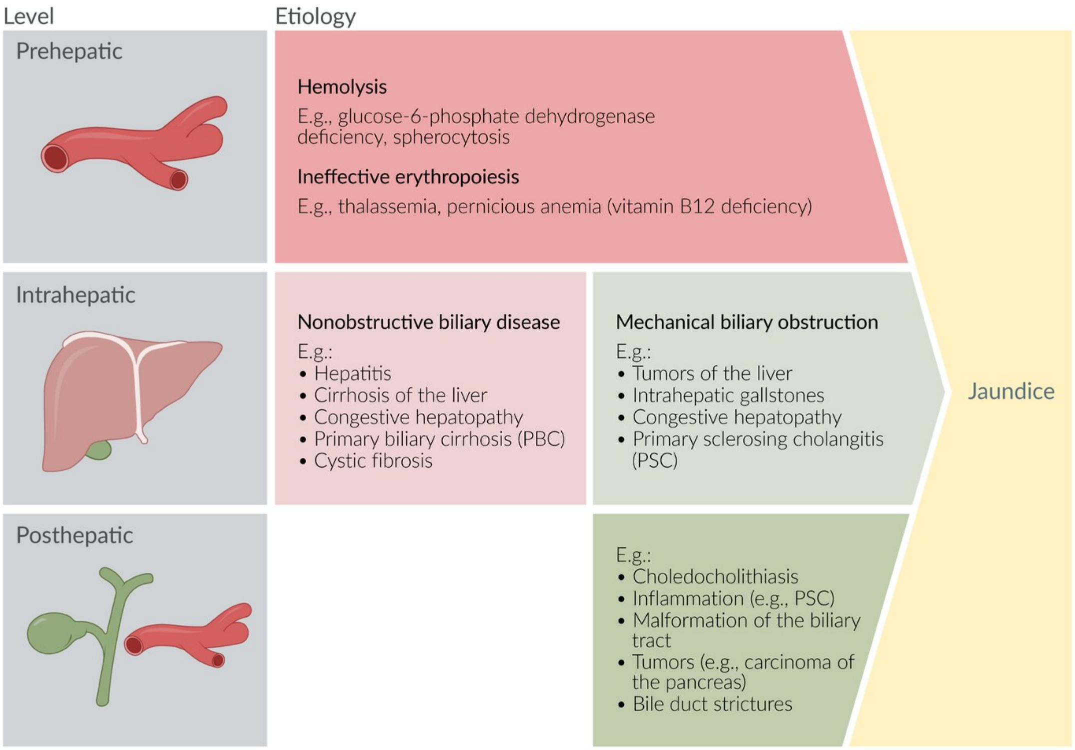
Answer B

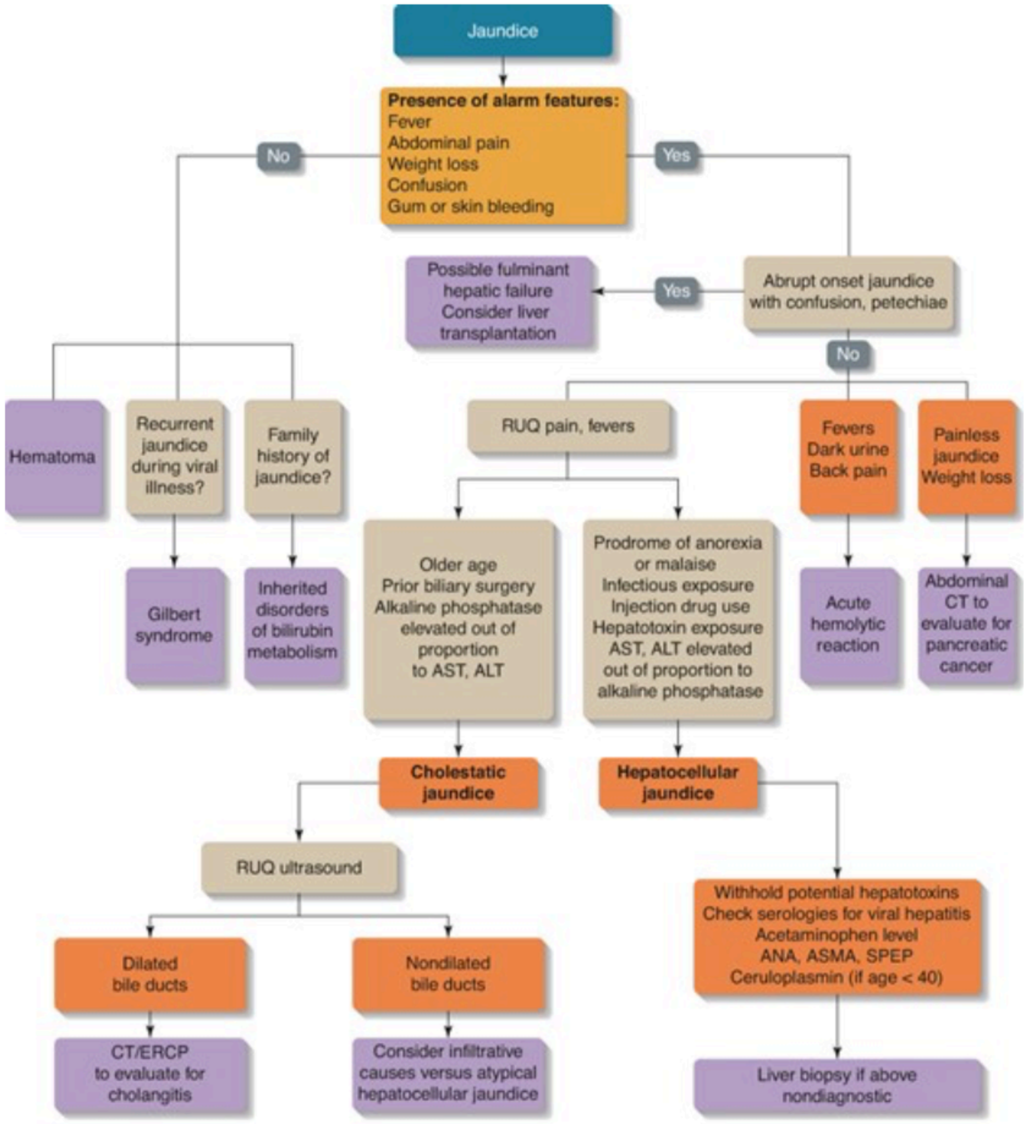
The slide shows sickle-cell anemia, an autosomal recessive trait seen in those of African, Mediterranean, or Asian heritage. It is found before the age of 6 in 90% of patients, with acute pain crises as the most common presentation. Prophylaxis for pain crises involves ensuring adequate oxygenation and hydration. Immunization against streptococcal infection is appropriate, as most patients are functionally asplenic. The patients often have daily prophylaxis with penicillin until the age of 5. Immunization and antibiotic prophylaxis do not, however, prevent pain crises. Chronic analgesics and scheduled transfusions have not been shown to reduce pain crises. Hydroxyurea, a myelosuppressive agent, has been proven to reduce the frequency of painful episodes.



JAUNDICE

Collected by: Fai Alrowais R3
Reviewed by: Afnan Alshenaifi R3
Editing and final revision: Nuha Aalmasoud R3


Level
Etiology
Prehepatic
Hemolysis
E.g., glucose-6-phosphate dehydrogenase deficiency, spherocytosis
Ineffective erythropoiesis
E.g., thalassemia, pernicious anemia (vitamin B12 deficiency)
Intrahepatic
Nonobstructive biliary disease
E.g.:
• Hepatitis
• Cirrhosis of the liver
• Congestive hepatopathy
• Primary biliary cirrhosis (PBC)
• Cystic fibrosis
Mechanical biliary obstruction
E.g.:
• Tumors of the liver
• Intrahepatic gallstones
• Congestive hepatopathy
• Primary sclerosing cholangitis (PSC)
Posthepatic
E.g.:
• Choledocholithiasis
• Inflammation (e.g., PSC)
• Malformation of the biliary tract
• Tumors (e.g., carcinoma of the pancreas)
• Bile duct strictures
Jaundice


Jaundice
Presence of alarm features:
Fever
Abdominal pain
Weight loss
Confusion
Gum or skin bleeding
No
Yes
Possible fulminant hepatic failure
Consider liver transplantation
Yes
Abrupt onset jaundice with confusion, petechiae
No
Hematoma
Recurrent jaundice during viral illness?
Family history of jaundice?
Gilbert syndrome
Inherited disorders of bilirubin metabolism
RUQ pain, fevers
Fevers
Dark urine
Back pain
Painless jaundice
Weight loss
Acute hemolytic reaction
Abdominal CT to evaluate for pancreatic cancer
Older age
Prior biliary surgery
Alkaline phosphatase elevated out of proportion to AST, ALT
Prodrome of anorexia or malaise
Infectious exposure
Injection drug use
Hepatotoxin exposure
AST, ALT elevated out of proportion to alkaline phosphatase
Cholestatic jaundice
Hepatocellular jaundice
RUQ ultrasound
Withhold potential hepatotoxins
Check serologies for viral hepatitis
Acetaminophen level
ANA, ASMA, SPEP
Ceruloplasmin (if age < 40)
Dilated bile ducts
Nondilated bile ducts
CT/ERCP to evaluate for cholangitis
Consider infiltrative causes versus atypical hepatocellular jaundice
Liver biopsy if above nondiagnostic

Alarm Feature	If Present in a Jaundiced Patient, Consider Serious Causes—	However, Benign Causes for This Include—
Fever	Cholangitis Gallstone disease Acute hepatitis (viral, toxin/alcohol, medication induced) Sepsis	Hematoma
Right upper quadrant pain	Cholangitis Gallstone disease Acute hepatitis Budd-Chiari syndrome Right sided heart failure	Varicella zoster Right lower lobe pneumonia Right sided pleural effusion Peptic ulcer disease Atypical renal colic Musculoskeletal pain
Confusion or altered mental status	Cholangitis Hepatic encephalopathy Sepsis Intracranial bleed due to coagulopathy Hypoglycemia Seizure	Delirium of any cause
Mucosal or cutaneous bleeding	Thrombocytopenia due to fulminant hepatic failure or hypersplenism Disseminated intravascular coagulation Falciparum malaria	Minor trauma to the affected sites
Back pain	Acute severe hemolysis	Musculoskeletal pain
Pregnancy	Hyperemesis gravidarum Acute fatty liver of pregnancy Eclampsia HELLP syndrome Intrahepatic cholestasis of pregnancy	
Dark urine	Hemoglobinuria from acute hemolysis Bilirubinuria (due to any cause of conjugated hyperbilirubinemia) Gross hematuria from coagulopathy	Dehydration, medications (rifampin: orange urine; beets: red urine) Myoglobinuria due to rhabdomyolysis
Involuntary weight loss	Pancreatic or hepatobiliary cancer	

- **Initial laboratory tests for jaundice**:

  serum total and unconjugated bilirubin, alkaline phosphatase, aminotransferases (aspartate aminotransferase [AST] and alanine aminotransferase [ALT]), prothrombin time/international normalized ratio (INR), and albumin.

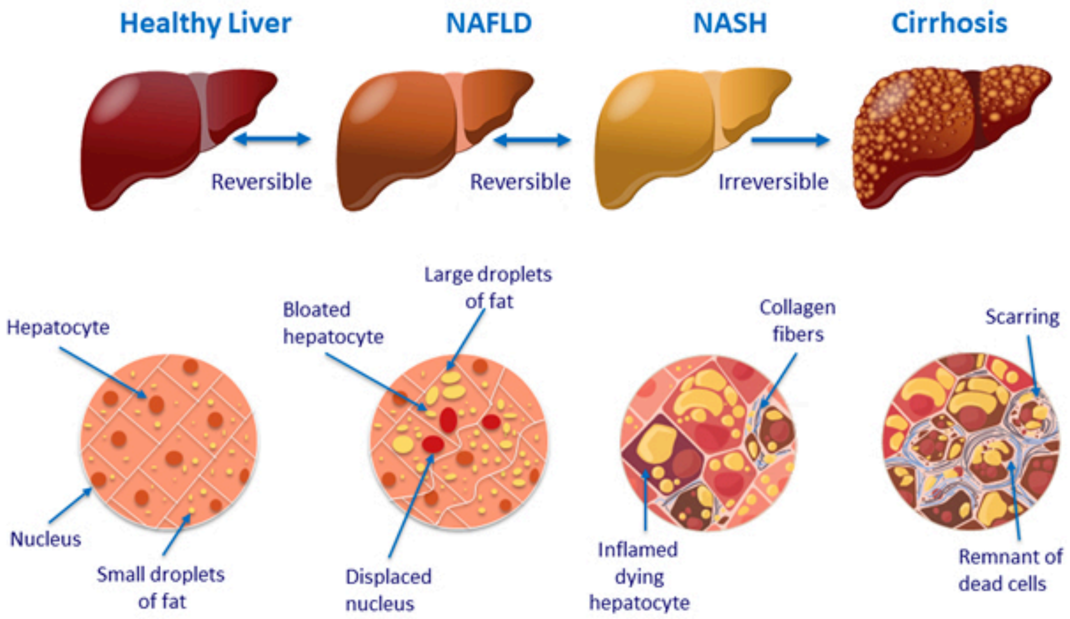
Nonalcoholic fatty liver disease (NAFLD) and nonalcoholic steatohepatitis (NASH)

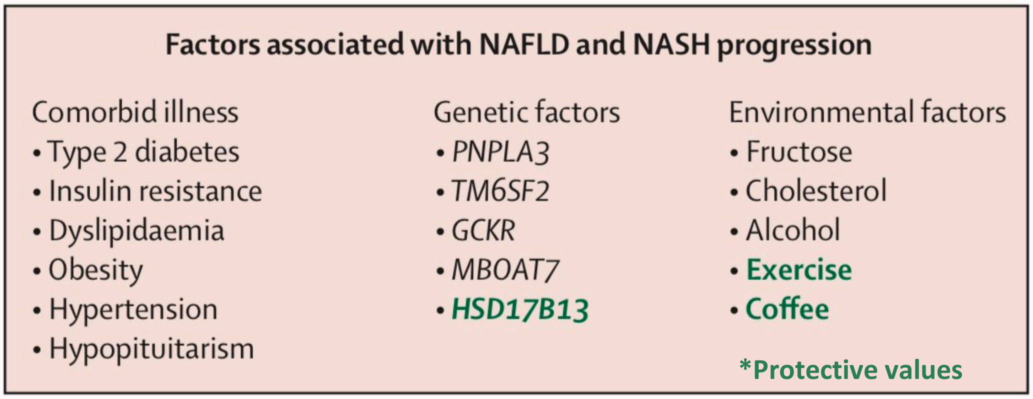
- NAFLD: non-alcohol related accumulation of fat in the liver cells (hepatic steatosis).
- NASH: NAFLD with chronic inflammation and damage of liver cells
- Frequent cause of mild Liver Function Test Abnormality
- Most common cause of cryptogenic Cirrhosis

! NASH is a diagnosis of exclusion. Other causes of chronic liver disease must be ruled out by laboratory studies and/or biopsy.

! A distinction between alcoholic and non-alcoholic fatty liver disease can only be drawn based on patient history.

! There is more ALT than AST (AST/ALT < 1) if the **L**iver is infiltrated with **L**ipids.


Healthy Liver
NAFLD
NASH
Cirrhosis
Reversible
Reversible
Irreversible
Hepatocyte
Nucleus
Small droplets of fat
Bloated hepatocyte
Large droplets of fat
Displaced nucleus
Collagen fibers
Inflamed dying hepatocyte
Scarring
Remnant of dead cells



Factors associated with NAFLD and NASH progression

Comorbid illness	Genetic factors	Environmental factors
• Type 2 diabetes	• *PNPLA3*	• Fructose
• Insulin resistance	• *TM6SF2*	• Cholesterol
• Dyslipidaemia	• *GCKR*	• Alcohol
• Obesity	• *MBOAT7*	• **Exercise**
• Hypertension	• ***HSD17B13***	• **Coffee**
• Hypopituitarism		

***Protective values**

Symptoms: Asymptomatic in most cases, Fatigue, Malaise, right upper quadrant pain.

Signs: Hepatomegaly (50%)

Labs: Liver Function Test (first line):
Liver Transaminases (ALT, AST), Alkaline Phosphatase, Gamma-Glutamyl transferase (GGT), Serum Bilirubin, Serum Albumin, Prothrombin Time.

Imaging:

- Right upper quadrant Ultrasound (Preferred first-line)

Diagnosis:

- **Noninvasive Tests for Advanced Fibrosis in NAFLD patients**

A. AST/ALT ratio (AAR)
    1. Score 0.8 or higher is suggestive of NAFLD with advanced fibrosis
B. AST/Platelet Count ratio index (APRI): <0.3 to 0.5 excludes significant liver fibrosis or Cirrhosis
C. NAFLD Fibrosis Score:

    - Finding: Increased liver echoes (fatty infiltrates)
    - Does not determine disease severity
    - Fibrosis and Steatosis are indistinguishable on Ultrasound

- CT Abdomen (unenhanced)
- MRI Abdomen with elastography

    - Score <-1.455 excludes advanced fibrosis while score >0.675 suggests advanced liver fibrosis
    - Consider MR Elastography (or Fibroscan) for Fibrosis Score >-1.455

D. BARD Score

    - Score <2 has a strong Negative Predictive Value (90-97%) for NAFLD with fibrosis

- **Liver Biopsy**

Management: Approach

A. **Step 1: Initial**
    1. Confirm likelihood of NASH as underlying cause
    2. Institute lifestyle change (e.g. weight loss, Healthy Diet, Exercise, hyperlipedemia management)
B. **Step 2: Month 6** (following lifestyle change)
    1. Repeat Liver Function Tests
    2. If Abnormal LFT consider liver imaging (RUQ Ultrasound) if not already done
C. **Step 3:** Evaluate with noninvasive tests for liver fibrosis
    1. Perform scoring
    2. Obtain Elastography Imaging if either score is abnormal
D. **Step 4:** Gastroenterology referral indications (for evaluation and often liver biopsy)
    1. Noninvasive tests and imaging suggest fibrosis
    2. Persistently elevated Liver Function Tests despite interventions
    3. Suspected secondary cause of Steatosis other than NASH (e.g. Hemochromatosis, Autoimmune Hepatitis)
E. **Step 5:** Monitoring: Repeat liver transaminases at least every 2 years for those with hepatic Steatosis on imaging

Management: Interventions

A. **Weight Reduction**

    I. Single most effective and important intervention
    II. Liver Function Tests improves or normalize with as little as 5-10% weight loss

        a. Hepatic Steatosis improves with 3-5% weight loss
        b. NAFLD histopathologic changes improve with 7-10% weight loss

    III. Fibrosis may not improve after weight loss
    IV. Low to moderate fat intake and low Carbohydrate
    V. Consider ursodeoxycholic acid which does improve liver enzymes and liver histology
    VI. Physical Activity 150 to 200 minutes of moderate to vigorous Exercise
    VII. Consider Bariatric Surgery
        a. NASH resolved in 85% of 109 patients in one study

B. **Avoid Hepatotoxins**
C. **Maximize Glucose control**
D. **Lipid Reduction as needed with Antihyperlipidemic**
E. **Control Hypertension**

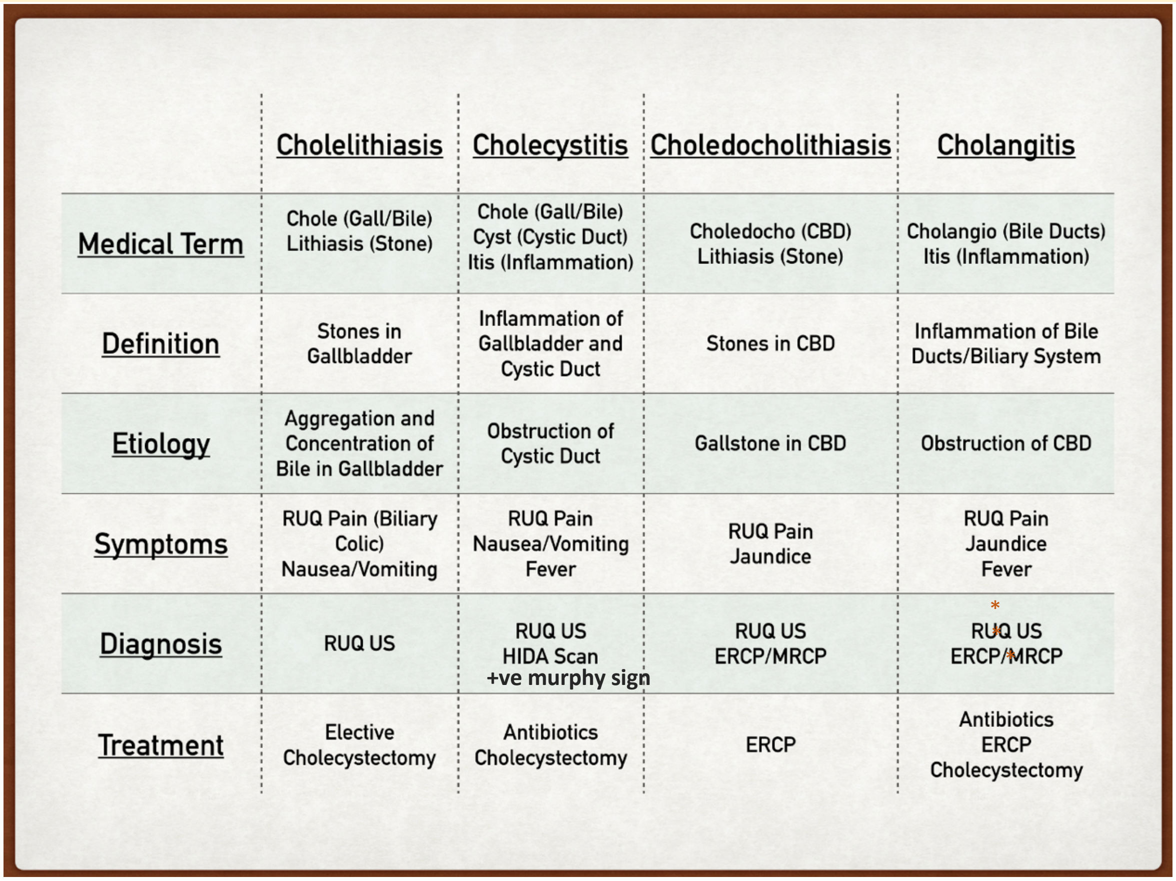
Prognosis:

A. **Nonalcoholic Fatty Liver** (Hepatic Steatosis without inflammation)
    1. Rare progression to Cirrhosis
    2. However, NAFLD overall is associated with increased cardiovascular mortality risk
B. **Nonalcoholic Steatohepatitis** (5% of general population, up to 66% of age >50 years with Diabetes Mellitus, Obesity)
    1. Hepatocellular Carcinoma: 1-5% risk
    2. Cirrhosis risk: 20% overall

Complications

- Portal Hypertension
- Cirrhosis
- Coronary Artery Disease
- Diabetic Retinopathy: Associated with increased Incidence in those with NAFLD and Diabetes Mellitus.

Cholestatic jaundice



	Cholelithiasis	Cholecystitis	Choledocholithiasis	Cholangitis
Medical Term	Chole (Gall/Bile) Lithiasis (Stone)	Chole (Gall/Bile) Cyst (Cystic Duct) Itis (Inflammation)	Choledocho (CBD) Lithiasis (Stone)	Cholangio (Bile Ducts) Itis (Inflammation)
Definition	Stones in Gallbladder	Inflammation of Gallbladder and Cystic Duct	Stones in CBD	Inflammation of Bile Ducts/Biliary System
Etiology	Aggregation and Concentration of Bile in Gallbladder	Obstruction of Cystic Duct	Gallstone in CBD	Obstruction of CBD
Symptoms	RUQ Pain (Biliary Colic) Nausea/Vomiting	RUQ Pain Nausea/Vomiting Fever	RUQ Pain Jaundice	RUQ Pain Jaundice Fever
Diagnosis	RUQ US	RUQ US HIDA Scan +ve murphy sign	RUQ US ERCP/MRCP	* RU*Q US ERCP/*MRCP
Treatment	Elective Cholecystectomy	Antibiotics Cholecystectomy	ERCP	Antibiotics ERCP Cholecystectomy

Neonatal Jaundice

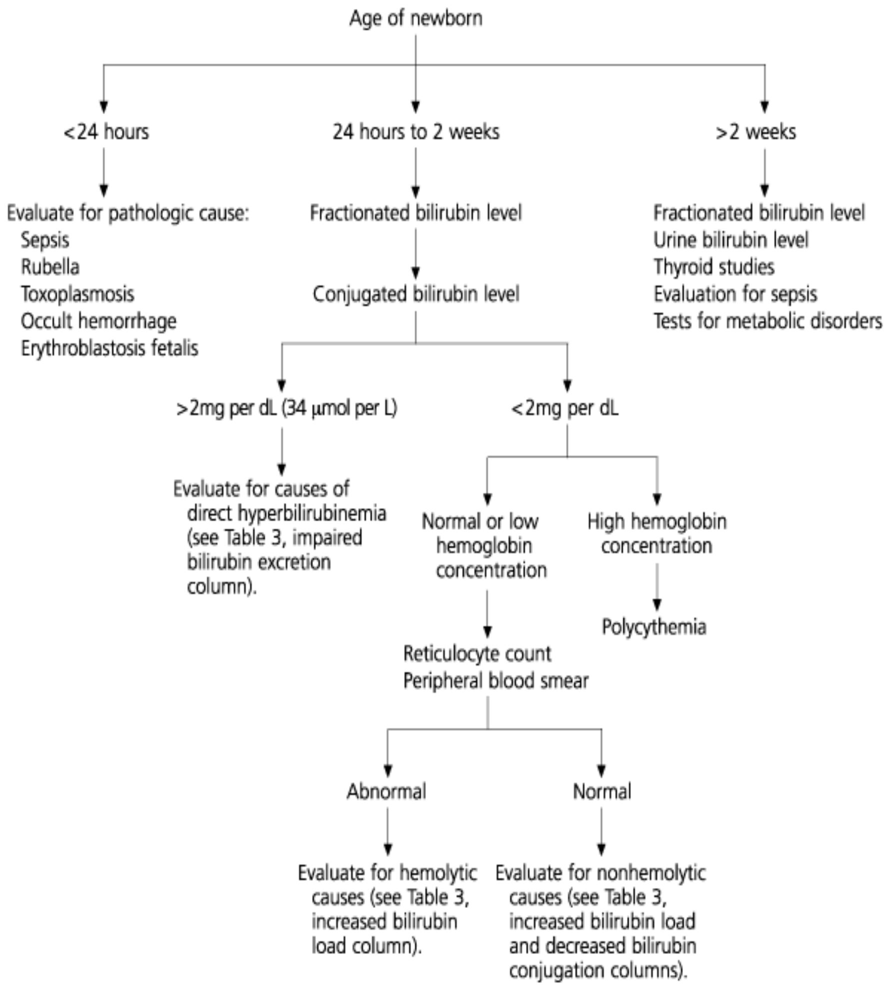
*Charcot triad

Noticeable jaundice if levels > 3 mg per dL

NORMAL CONJUGATED BILIRUBIN LEVELS ⟶ * < 1 mg/dL if total bilirubin < 5 mg/dL
* < 20% of the total bilirubin if total serum bilirubin is > 5 mg/dL

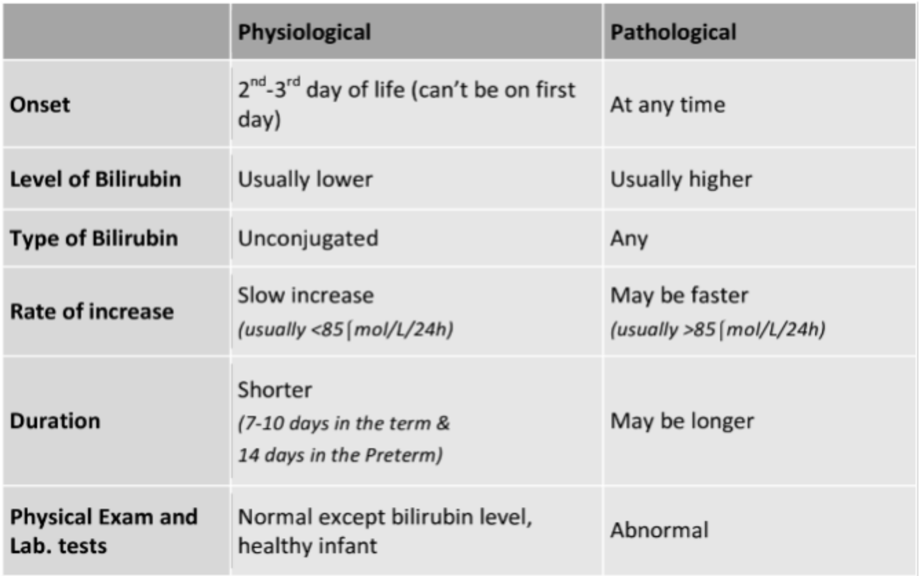
- TOTAL BILIRUBIN rises slower than 0.2 mg/dL/hr or 5 mg/dL/day
- OVERALL LEVEL doesn't exceed 18 mg/dL
- RESOLVES within 1 wk in full-term infants or 2 wks in preterm infants

← **Physiological Jaundice**

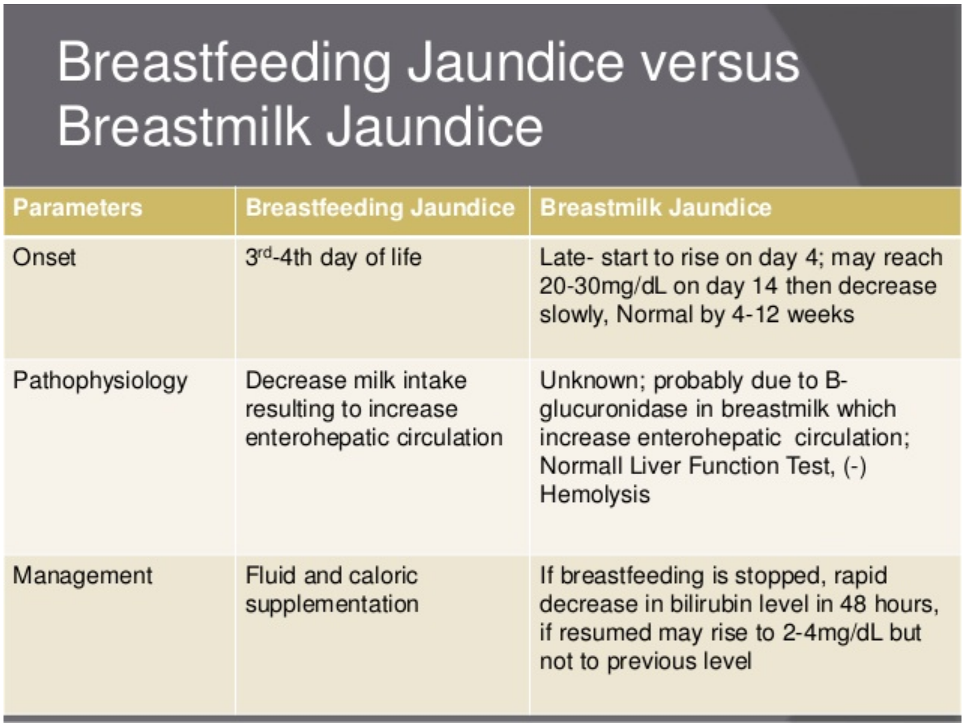

Age of newborn
<24 hours
24 hours to 2 weeks
>2 weeks
Evaluate for pathologic cause:
Sepsis
Rubella
Toxoplasmosis
Occult hemorrhage
Erythroblastosis fetalis
Fractionated bilirubin level
Conjugated bilirubin level
Fractionated bilirubin level
Urine bilirubin level
Thyroid studies
Evaluation for sepsis
Tests for metabolic disorders
>2mg per dL (34 µmol per L)
<2mg per dL
Evaluate for causes of direct hyperbilirubinemia (see Table 3, impaired bilirubin excretion column).
Normal or low hemoglobin concentration
High hemoglobin concentration
Polycythemia
Reticulocyte count
Peripheral blood smear
Abnormal
Normal
Evaluate for hemolytic causes (see Table 3, increased bilirubin load column).
Evaluate for nonhemolytic causes (see Table 3, increased bilirubin load and decreased bilirubin conjugation columns).

At Birth or Within 24h	Within The 1st Week
Hemolysis (Blood group incompatibility) Congenital infection (TORCH) Sepsis	Physiological jaundice Congenital infection (TORCH) Sepsis Concealed hemorrhage Crigler-Najjar syndrome

After The 1st Week	Persistent After 2nd Week
Breast milk jaundice Sepsis Hepatitis Biliary atresia Hypothyroidism Galactosemia Inherited hemolytic anemia	Neonatal hepatitis Biliary atresia Inspissated bile syndrome



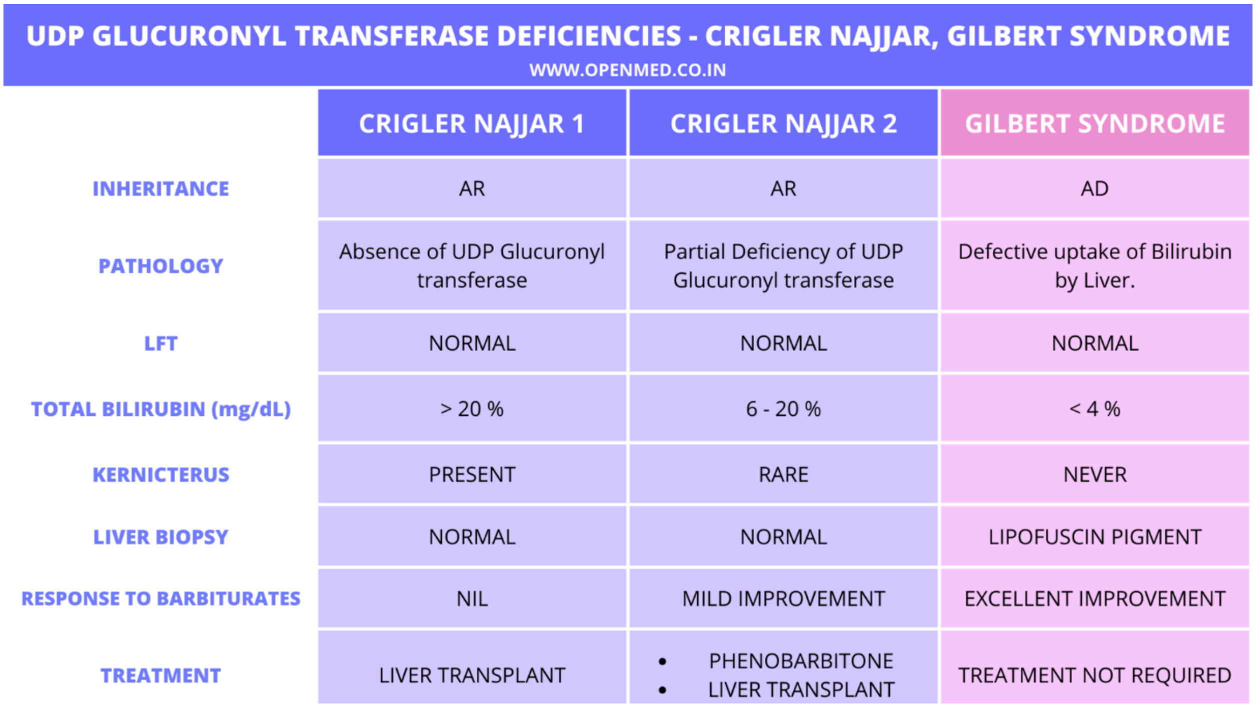
	Physiological	Pathological
Onset	2nd-3rd day of life (can't be on first day)	At any time
Level of Bilirubin	Usually lower	Usually higher
Type of Bilirubin	Unconjugated	Any
Rate of increase	Slow increase *(usually <85[mol/L/24h)*	May be faster *(usually >85[mol/L/24h)*
Duration	Shorter *(7-10 days in the term & 14 days in the Preterm)*	May be longer
Physical Exam and Lab. tests	Normal except bilirubin level, healthy infant	Abnormal



Breastfeeding Jaundice versus Breastmilk Jaundice

Parameters	Breastfeeding Jaundice	Breastmilk Jaundice
Onset	3rd-4th day of life	Late- start to rise on day 4; may reach 20-30mg/dL on day 14 then decrease slowly, Normal by 4-12 weeks
Pathophysiology	Decrease milk intake resulting to increase enterohepatic circulation	Unknown; probably due to B-glucuronidase in breastmilk which increase enterohepatic circulation; Normall Liver Function Test, (-) Hemolysis
Management	Fluid and caloric supplementation	If breastfeeding is stopped, rapid decrease in bilirubin level in 48 hours, if resumed may rise to 2-4mg/dL but not to previous level

Unconjugated hyperbilirubinemia



UDP GLUCURONYL TRANSFERASE DEFICIENCIES - CRIGLER NAJJAR, GILBERT SYNDROME

WWW.OPENMED.CO.IN

	CRIGLER NAJJAR 1	CRIGLER NAJJAR 2	GILBERT SYNDROME
INHERITANCE	AR	AR	AD
PATHOLOGY	Absence of UDP Glucuronyl transferase	Partial Deficiency of UDP Glucuronyl transferase	Defective uptake of Bilirubin by Liver.
LFT	NORMAL	NORMAL	NORMAL
TOTAL BILIRUBIN (mg/dL)	> 20 %	6 - 20 %	< 4 %
KERNICTERUS	PRESENT	RARE	NEVER
LIVER BIOPSY	NORMAL	NORMAL	LIPOFUSCIN PIGMENT
RESPONSE TO BARBITURATES	NIL	MILD IMPROVEMENT	EXCELLENT IMPROVEMENT
TREATMENT	LIVER TRANSPLANT	• PHENOBARBITONE • LIVER TRANSPLANT	TREATMENT NOT REQUIRED

Conjugated hyperbilirubinemia

- The most common causes are biliary atresia (33%-50%) and idiopathic neonatal hepatitis (10%-15%).
- Total and direct bilirubin should be measured in infants with jaundice persisting beyond 2-3 weeks.

Biliary atresia:

- It is the leading cause of liver transplant in young children.
- Complications may include biliary and liver fibrosis and cirrhosis, with subsequent portal hypertension.
- Suspect biliary atresia (BA) in any neonate with persistent or new jaundice > 14 days old.
- Obstructive symptoms: jaundice, acholic stool and dark urine.
- Signs: hepatomegaly.
- Surgical management (hepatoportoenterostomy or Kasai procedure)

Neonatal Jaundice treatment

Two major treatment options: Phototherapy and Exchange transfusion.

Phototherapy is the first-line treatment

Stopping Phototherapy and Monitoring for Rebound Hyperbilirubinemia:

- TSB has decreased by at least 2 mg/dL below the hour-specific threshold used at the initiation of treatment
- collect TSB 18-24 hours following discontinuation of phototherapy to evaluate for rebound hyperbilirubinemia

Complications:

- Skin Rashes
- Overheating
- Dehydration (Insensible water loss, Diarrhea)
- Electrolyte disturbance (Hyponatremia, Hypokalemia)
- Bronze baby syndrome
    - Dark, grayish brown discoloration of skin
    - May persist for months

- Associated with Conjugated_Hyperbilirubinemia

! Ceftriaxone (Rocephin) is contraindicated in neonates with hyperbilirubinemia due to an increased risk of bilirubin encephalopathy.

Red flags of neonatal jaundice:

- Jaundice in the first day of life or after 2 weeks of age
- Total serum bilirubin > 18 mg/dL (> 308 micromol/L)
- Rate of rise of total serum bilirubin > 0.2 mg/dL/hour (> 3.4 micromol/L/hour) or > 5 mg/dL/day (> 86 micromol/L/day)
- Conjugated hyperbilirubinemia
- Lethargy, irritability, respiratory distress, hypotonia, seizures

Bilirubin Encephalopathy

- Seen mostly in severe hyperbilirubinemia (>428mmol/L)
- Initially presents with sleepiness, mild hypotonia, high-pitched cry
- Can progress to apnea, seizures, severe hypotonia

Chronic Bilirubin Encephalopathy (kernicterus):

- Cerebral palsy
- Sensorineural hearing loss
- Gaze palsies

! Duration at which bilirubin toxicity occurs is unknown, however acute toxicity should be considered in term infant with total serum bilirubin > 25 mg/dL and no hemolysis, or total serum bilirubin > 20 mg/dL with hemolysis

Approach to Jaundice
MCQs

ABFM 2022

Once hemolysis is excluded, the most common cause of unconjugated hyperbilirubinemia is:

A. Alcoholic liver disease.
B. Biliary tract disease.
C. Fatty liver disease.
D. Gilbert syndrome.
E. Wilson disease.

Answer: D.
Unconjugated hyperbilirubinemia can be defined as an elevated indirect bilirubin level. While unconjugatedhyperbilirubinemia is most commonly seen in hemolysis, another common cause is Gilbert syndrome, which stems from a genetic defect that affects how the liver processes bilirubin. Alcoholic liver disease, biliary tract disease, fatty liver disease, and Wilson disease do not lead to unconjugated hyperbilirubinemia.

You see a 45-year-old male with fatigue, arthralgias, and mildly elevated liver function tests.You are considering hereditary hemochromatosis as a possible diagnosis.Which one of the following should you order first?

A. A serum ferritin level and transferrin saturation.
B. Genetic testing for HFE mutations.
C. T2-weighted MRI for hepatic iron concentration.
D. A liver biopsy.

Answer: A.
The initial tests used in the workup for suspected hemochromatosis are a serum ferritin level andtransferrin saturation. A transferrin saturation >45% and a serum ferritin level >300 ng/mL in men or>200 ng/mL in women are indicative of iron overload and highly suggestive of hereditaryhemochromatosis. A serum iron level is ordered as part of transferrin saturation testing, but an elevatediron level by itself is not as sensitive or specific as the other tests. Other etiologies of iron overload shouldbe ruled out, including liver disease, alcohol abuse, and metabolic syndrome. If no secondary etiologiesare found, genetic testing would be appropriate to identify HFE mutations indicating hereditaryhemochromatosis. Genetic testing should not be performed in a patient without iron overload or a familyhistory of hereditary hemochromatosis. MRI may help determine the risk of developing cirrhosis, and aliver biopsy is used to determine the amount of liver damage.

A previously healthy 44-year-old female presents to the emergency department (ED) withsevere, sharp, right upper quadrant abdominal pain and nausea that began shortly after eatingdinner. On examination she is noted to have a low-grade fever with a positive Murphy sign. Alaboratory analysis is notable for leukocytosis with a left shift and a mildly elevated totalbilirubin level. A lipase level and liver transaminases are normal. Ultrasonography revealsseveral small gallstones, gallbladder wall thickening, and pericholecystic fluid. After receivingintravenous fluids, pain management, and antiemetic treatment in the ED, her symptoms improve. In addition to intravenous antibiotics, the most appropriate next step in management would beto offer

- A. Expectant management.
- B. Endoscopic retrograde cholangiopancreatography (ERCP).
- C. Laparoscopic cholecystectomy.
- D. Outpatient general surgery consultation.

Answer: C.

This patient presents with signs and symptoms of acute cholecystitis, and ultrasonography confirms thepresence of gallstones and gallbladder inflammation. While most patients with acute cholecystitis will havesymptoms that improve with supportive care over 2–7 days, the risk of recurrent symptoms andcomplications increases with delayed surgical intervention. The Choosing Wisely initiative recommendsthat surgical treatment be offered to the patient during the initial hospitalization. The Society of AmericanGastrointestinal and Endoscopic Surgeons has found that laparoscopic cholecystectomy is safe andcost-effective in the immediate hospital setting. This stable, uncomplicated patient should be offered laparoscopic cholecystectomy during the current visit. Offering outpatient options such as expectantmanagement and surgical consultation at a later date may increase this patient’s risk of recurrent symptomsand complications as well as costs. Since she does not have signs of obstructive cholangitis such as elevatedliver enzymes and jaundice, endoscopic retrograde cholangiopancreatography (ERCP) is not indicated

ABFM 2021

A 42-year-old female sees you because of intermittent right upper abdominal pain that occurs after eating. The episodes have been gradually worsening and now last up to an hour. She has tried over-the-counter antacids, ibuprofen, and acetaminophen, which have not helped. She tells you that the last episode occurred earlier this week and the pain was so severe that it woke her up and she went to the emergency department (ED). A comprehensive metabolic panel, CBC, and lipase level performed in the ED were all normal. Right upper quadrant abdominal ultrasonography today is negative for gallstones but notable for increased echogenicity of the liver. Which one of the following would be the most appropriate next step in the evaluation?

- A. Plain radiography of the abdomen.
- B. CT of the abdomen.
- C. Hepatobiliary scintigraphy (HIDA).
- D. Magnetic resonance cholangiopancreatography (MRCP).
- E. Endoscopic retrograde cholangiopancreatography (ERCP).

Answer: C.

This patient presents with classic biliary symptoms and normal right upper quadrant ultrasonography, liver enzymes, and pancreatic enzymes. Abdominal ultrasonography was negative for gallstones. The next most appropriate test is hepatobiliary scintigraphy, also known as a hepatobiliary iminodiacetic acid (HIDA) scan. While a normal HIDA scan does not exclude a diagnosis of functional gallbladder disease (also referred to as acalculous cholecystitis, biliary dyskinesia, and biliary dysmotility), an abnormal study identifies patients for whom cholecystectomy is strongly recommended. Plain radiography of the abdomen and CT of the abdomen are helpful to evaluate for other etiologies of abdominal pain but are not the most appropriate next step for a patient with classic biliary symptoms and a normal laboratory workup. Magnetic resonance cholangiopancreatography (MRCP) is reserved for suspected choledocholithiasis. Endoscopic retrograde cholangiopancreatography (ERCP) is an invasive test also used for choledocholithiasis and in conjunction with sphincterotomy and stone extraction.

A 46-year-old male comes to your office for a routine health maintenance examination. He had elevated AST and ALT levels on previous laboratory testing. He reports consuming only one alcoholic drink twice a month. He does not take any medications, including over-the-counter medications. A physical examination is normal except for a BMI of 32 kg/m2. Laboratory testing shows an AST level of 72 U/L (N 10–59) and an ALT level of 96 U/L (N 13–40). A hepatitis panel, serum ferritin level, serum iron level, lipid profile, and fasting glucose level are all within normal limits. Ultrasonography of the right upper quadrant shows fatty infiltration of the liver. Which one of the following would be the first-line treatment of this condition?

A. Biguanides such as metformin (Glucophage).
B. GLP-1 analogs such as liraglutide (Victoza).
C. Thiazolidinediones such as pioglitazone (Actos).
D. Weight loss with diet and exercise.
E. Bariatric surgery.

Answer: D.

This patient has nonalcoholic fatty liver disease (NAFLD) based on his elevated liver enzymes and ultrasonography of his liver. Obesity is a risk factor for NAFLD, and the primary treatment of NAFLD is weight loss with diet and exercise. Biguanides are not a treatment option for NAFLD as trials have shown that metformin does not improve liver histology in NAFLD. GLP-1 analogues, thiazolidinediones, vitamin E supplementation, and bariatric surgery are helpful for some patients but do not have enough evidence to support their use as primary treatment options.

While on rounds in the newborn nursery, you receive a call about a 2-day-old infant born at 39 weeks gestation. According to the American Academy of Pediatrics standard treatment guidelines for infants at high risk of bilirubin encephalopathy, the infant has an elevated total serum bilirubin level that is approaching the threshold for initiating phototherapy. Which one of the following additional factors would be the strongest indication for phototherapy in this infant?

A. East Asian ethnicity.
B. Exclusive breastfeeding.
C. A positive direct antibody titer (Coombs test).
D. A sibling with a history of neonatal jaundice.
E. Untreated maternal group B streptococcal colonization.

Answer: C.

Although up to 84% of term newborns experience neonatal jaundice, severe hyperbilirubinemia (total serum bilirubin level >20 mg/dL) occurs in <2% of term infants. Prompt identification and management of severe hyperbilirubinemia is critical due to the risk of neurologic injury from untreated bilirubin toxicity. Acute bilirubin encephalopathy develops in 1 in 10,000 infants, and kernicterus (chronic bilirubin encephalopathy) occurs in 1 in 100,000 infants and can lead to permanent neurodevelopmental delay. Neonates at high risk of bilirubin toxicity are treated with phototherapy to decrease bilirubin levels through the breakdown of unconjugated bilirubin into byproducts that are excreted into stool and urine. In infants at even higher risk, exchange transfusion may be indicated. Treatment guidelines published by the American Academy of Pediatrics stratify infants according to risk. Risk factors for toxicity include earlier gestational age at birth, hemolysis, sepsis, acidosis, G6PD deficiency, lethargy, asphyxia, temperature instability, acidosis, and hypoalbuminemia. Of the options listed, hemolysis, which is associated with a positive direct antibody titer (Coombs test), is the most significant risk factor for developing acute bilirubin encephalopathy, and therefore impacts the treatment threshold for initiation of phototherapy. While East Asian race, exclusive breastfeeding, and a sibling with a history of neonatal jaundice are risk factors for severe hyperbilirubinemia, they do not impact the phototherapy treatment threshold. Similarly, untreated maternal group B Streptococcus colonization may increase an infant's risk of developing neonatal sepsis, although it is not a direct risk factor for bilirubin encephalopathy.

ABFM 2019

A gravida 2 para 0 at 34 weeks gestation presents to your office because of diffuse itching. She does not have any known allergies other than seasonal allergies, and she does not have any new contacts. An examination is normal other than some scattered excoriations, and there is no other distinct rash. She has tried moisturizers, but her symptoms have not improved. Which one of the following would be most appropriate at this point?

A. Monitoring for the development of a rash.
B. Liver function tests and serum bile acid levels.
C. Topical corticosteroids.
D. Oral antihistamines.
E. Varicella-zoster immune globulin.

Answer: B.

Whenever a pregnant woman presents with pruritus without a primary rash, it is important to evaluate her for intrahepatic cholestasis of pregnancy. This diagnosis is associated with increased fetal mortality and warrants increased antenatal surveillance as well as possible induction by 35–37 weeks gestation. It is most appropriate to check for elevation of liver function tests and serum bile acids. Emollients, topical corticosteroids, and oral antihistamines can all be helpful for pruritus and certain rashes, but in this patient it is most important to promptly look for the cause of the pruritus. Varicella-zoster immune globulin would be indicated if she had no immunity to varicella and had been exposed to varicella or if she had a rash that was suspected to be chickenpox.

ABFM 2015-2019

A 49-year-old male brings you a copy of his laboratory results obtained during an insurance examination. The patient says he feels fine, but his bilirubin level was 2.5 mg/dL (N <1.0). He says he averages 5 alcoholic beverages per week and takes no medications other than occasional ibuprofen. On examination he is not jaundiced and has no scleral icterus, and the remainder of the examination is within normal limits, including palpation of the liver and spleen. Laboratory testing reveals a normal CBC, normal liver enzyme levels, and normal serum haptoglobin. Bilirubin fractionation reveals an indirect level of 2.0 mg/dL and a direct level of 0.5 mg/dL (N <0.4). The most likely diagnosis is

A. Asymptomatic cholecystitis.
B. Alcoholic liver disease.
C. Gilbert's syndrome.
D. Hemolytic anemia.

Answer: C.

Gilbert's syndrome is a hereditary condition associated with unconjugated hyperbilirubinemia (usually with a bilirubin level <5.0 mg/dL). The bilirubin level increases with infection, exertion, and fasting. Patients are asymptomatic and have otherwise normal liver function studies. The differential diagnosis includes hemolytic anemias, which cause a decrease in serum haptoglobin, an increase in lactate dehydrogenase, and/or CBC abnormalities, particularly on the peripheral smear.

A 65-year-old male has severe liver cirrhosis from a combination of hepatitis C infection and alcohol abuse. He previously underwent a transjugular intrahepatic portosystemic shunt (TIPS) procedure. While the TIPS procedure reduces the likelihood of most complications of cirrhosis, it may increase the risk for which one of the following?

A. Anasarca.
B. Ascites.
C. Hepatic encephalopathy.
D. Upper gastrointestinal bleeding from esophageal varices.
E. Upper gastrointestinal bleeding from portal hypertensive gastropathy.

Answer: C.

The transjugular intrahepatic portosystemic shunt (TIPS) procedure, by shunting blood destined for the liver into the systemic circulation, lowers pressure in the portal veins, thereby decreasing portal system hypertension and making variceal bleeding and portal hypertensive gastropathy less likely. TIPS may decrease the likelihood of variceal bleeding by as much as 90%. TIPS also reduces the pressure that leads to ascites and lower extremity edema, or the massive edema of anasarca. The diversion of blood from the liver circulation compromises the liver's role in removing toxins, including the serum marker ammonia. This may make patients more vulnerable to episodes of hepatic encephalopathy.

You see a 53-year-old female with diabetes mellitus, hypertension, mixed hyperlipidemia, and GERD. Recent laboratory studies include an incidental finding of thrombocytopenia. The patient has no other significant past medical history, and she does not use tobacco or drink alcohol. Her current medications include metformin (Glucophage), lisinopril (Prinivil, Zestril), omeprazole (Prilosec), calcium citrate, and pravastatin (Pravachol). A physical examination is notable for a BMI of 31.3 kg/m2. Her skin, heart, lungs, abdomen, and extremities are normal. Results of a CBC and a comprehensive metabolic panel are normal with the following exceptions

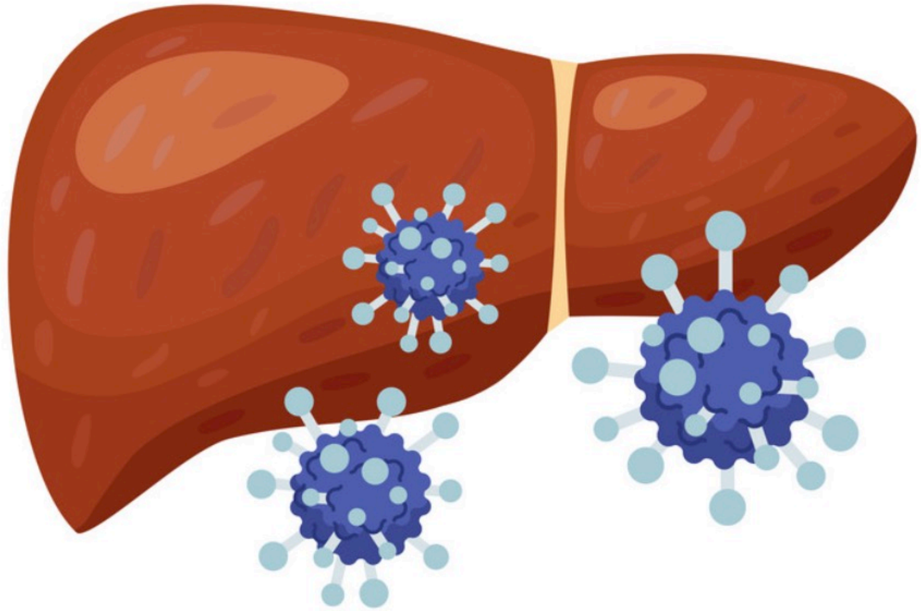
Platelets 70,000 (N 150,000-379,000)
Glucose 108mg/dL
Bilirubin 0.4mg/dL (N0.0-0.4)
Alkaline phosphatase 175U/L (N38-126)
ALT(SGPT) .... 52 U/L (N 10-28)

A peripheral smear is normal except for reduced platelets. Tests for hepatitis B, hepatitis C, and HIV are negative. The most likely etiology of this patient's thrombocytopenia is:

A. A hematologic malignancy.
B. Chronic liver disease.
C. Drug-induced thrombocytopenia.
D. Immune thrombocytopenic purpura (ITP).
E. Primary bone marrow failure.

Answer: B.

This patient presents with a typical example of nonalcoholic steatohepatitis (NASH) progressing toward cirrhosis, with multiple risk factors including diabetes mellitus, hyperlipidemia, obesity, and mildly elevated hepatic transaminases. Abnormalities of other cell lines would likely occur if a hematologic malignancy or bone marrow failure were present. While immune thrombocytopenic purpura is a diagnostic consideration, it is much less common than NASH and requires other causes to be ruled out. This patient is not taking any medications that have been frequently reported to cause drug-induced thrombocytopenia.



Viral Hepatitis Labs Interpretations

Collected and edited by: Nuha Almasoud R3
Reviewed by: Shaima Alduaiji R3

Elevated liver enzymes

Elevated liver Enzymes:

Background:

Liver function tests consist of AST, ALT, alkaline phosphatase, and bilirubin. Actual numbers vary based on laboratory equipment and the reference population selected. Although the term "liver function tests" (LFTs) is used commonly, it is imprecise and potentially misleading since many of the tests reflecting the health of the liver are not direct measures of its function. Furthermore, the commonly used liver biochemical tests may be abnormal even in patients with a healthy liver. Abnormal liver biochemical and function tests are frequently detected in asymptomatic patients since many screening blood test panels routinely include them.

Pathophysiology:

Alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase, and bilirubin are biochemical markers of liver injury. Albumin, bilirubin, and prothrombin time are markers of hepatocellular function. Subsequent testing is determined based on the information gathered from the history and physical examination as well as the pattern of liver test abnormalities.

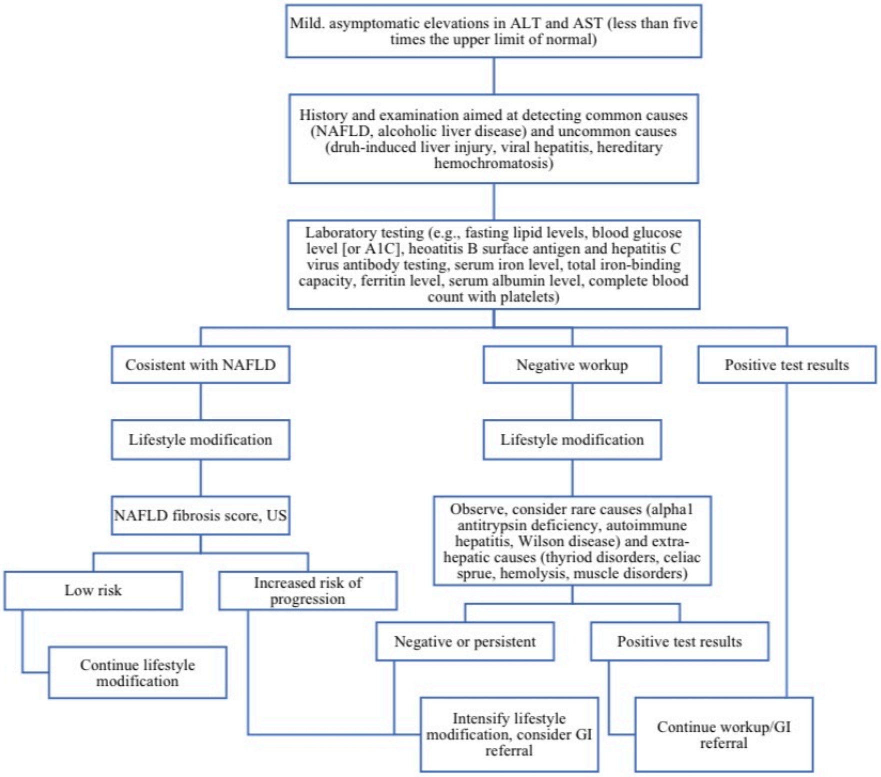
Liver biochemical test abnormalities can often be grouped into one of several patterns:

hepatocellular, cholestatic, or isolated hyperbilirubinemia. In the setting of hepatocyte damage, **ALT and AST** are released from hepatocytes, leading to increased serum levels. Patients with a hepatocellular process generally have a disproportionate elevation in the serum aminotransferases compared with the **alkaline phosphatase**, while those with a cholestatic process have the opposite findings.

The **serum bilirubin** can be prominently elevated in both hepatocellular and cholestatic conditions and therefore is not necessarily helpful in differentiating between the two. Abnormal tests of synthetic function may be seen with both hepatocellular injury and cholestasis. The etiologies of elevated liver enzymes, alkaline phosphatase, and isolated hyperbilirubinemia are broad.

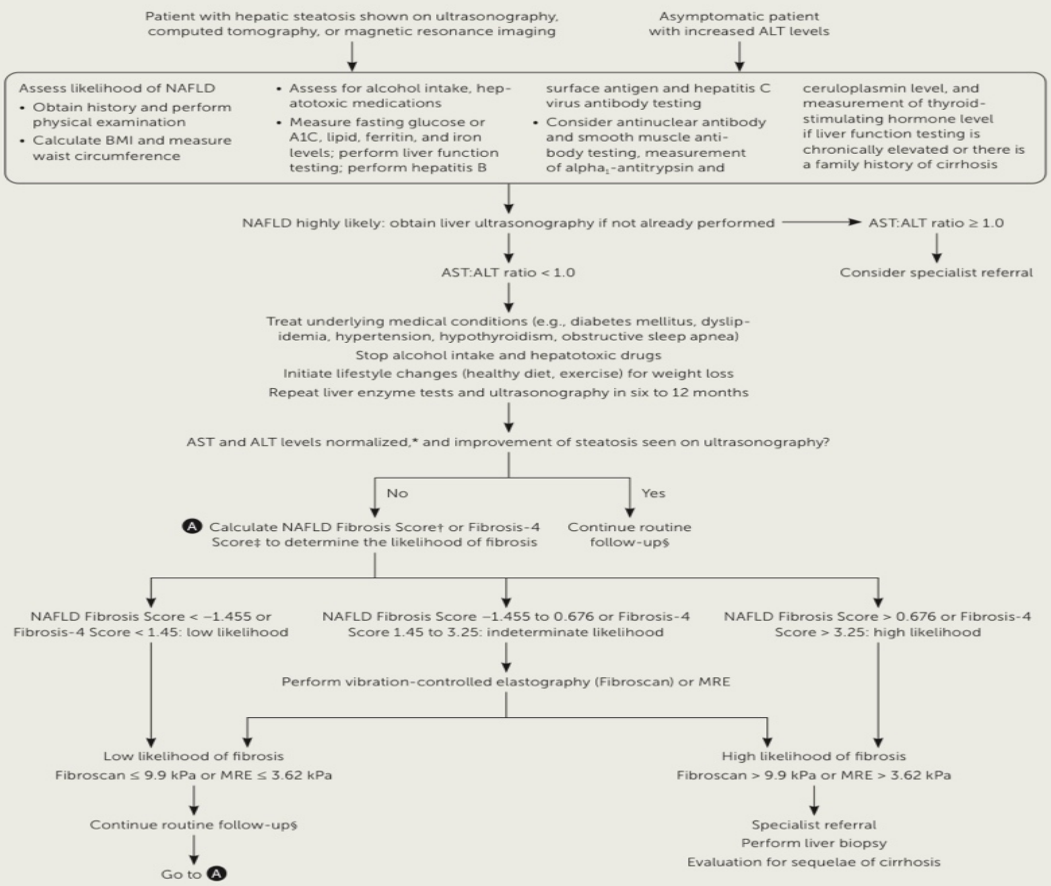
The evaluation should consider the patient's risk factors for liver disease as well as findings from physical examination that may point to a particular diagnosis.

Management of elevated liver enzymes:


Mild. asymptomatic elevations in ALT and AST (less than five times the upper limit of normal)
History and examination aimed at detecting common causes (NAFLD, alcoholic liver disease) and uncommon causes (druh-induced liver injury, viral hepatitis, hereditary hemochromatosis)
Laboratory testing (e.g., fasting lipid levels, blood glucose level [or A1C], heoatitis B surface antigen and hepatitis C virus antibody testing, serum iron level, total iron-binding capacity, ferritin level, serum albumin level, complete blood count with platelets)
Cosistent with NAFLD
Negative workup
Positive test results
Lifestyle modification
Lifestyle modification
NAFLD fibrosis score, US
Observe, consider rare causes (alpha1 antitrypsin deficiency, autoimmune hepatitis, Wilson disease) and extra-hepatic causes (thyriod disorders, celiac sprue, hemolysis, muscle disorders)
Low risk
Increased risk of progression
Negative or persistent
Positive test results
Continue lifestyle modification
Intensify lifestyle modification, consider GI referral
Continue workup/GI referral

Algorithm 1: Management of elevated liver transaminase levels

FIGURE 2



Patient with hepatic steatosis shown on ultrasonography, computed tomography, or magnetic resonance imaging

Asymptomatic patient with increased ALT levels

Assess likelihood of NAFLD
- Obtain history and perform physical examination
- Calculate BMI and measure waist circumference
- Assess for alcohol intake, hepatotoxic medications
- Measure fasting glucose or A1C, lipid, ferritin, and iron levels; perform liver function testing; perform hepatitis B surface antigen and hepatitis C virus antibody testing
- Consider antinuclear antibody and smooth muscle antibody testing, measurement of alpha$_1$-antitrypsin and ceruloplasmin level, and measurement of thyroid-stimulating hormone level if liver function testing is chronically elevated or there is a family history of cirrhosis

NAFLD highly likely: obtain liver ultrasonography if not already performed

AST:ALT ratio ≥ 1.0

Consider specialist referral

AST:ALT ratio < 1.0

Treat underlying medical conditions (e.g., diabetes mellitus, dyslipidemia, hypertension, hypothyroidism, obstructive sleep apnea)
Stop alcohol intake and hepatotoxic drugs
Initiate lifestyle changes (healthy diet, exercise) for weight loss
Repeat liver enzyme tests and ultrasonography in six to 12 months

AST and ALT levels normalized,* and improvement of steatosis seen on ultrasonography?

No

Yes

Ⓐ Calculate NAFLD Fibrosis Score† or Fibrosis-4 Score‡ to determine the likelihood of fibrosis

Continue routine follow-up§

NAFLD Fibrosis Score < −1.455 or Fibrosis-4 Score < 1.45: low likelihood

NAFLD Fibrosis Score −1.455 to 0.676 or Fibrosis-4 Score 1.45 to 3.25: indeterminate likelihood

NAFLD Fibrosis Score > 0.676 or Fibrosis-4 Score > 3.25: high likelihood

Perform vibration-controlled elastography (Fibroscan) or MRE

Low likelihood of fibrosis
Fibroscan ≤ 9.9 kPa or MRE ≤ 3.62 kPa

Continue routine follow-up§

Go to Ⓐ

High likelihood of fibrosis
Fibroscan > 9.9 kPa or MRE > 3.62 kPa

Specialist referral
Perform liver biopsy
Evaluation for sequelae of cirrhosis

ALT = alanine transaminase; AST = aspartate transaminase; BMI = body mass index; kPa = kilopascal; MRE = magnetic resonance elastography; NAFLD = nonalcoholic fatty liver disease.

*—Normal ALT and AST = 0 to 35 U per L (0 to 0.58 μkat per L).

†—NAFLD Fibrosis Score: −1.675 + 0.037 – age (years) + 0.094 – BMI (kg per m^2) + 1.13 × impaired fasting glucose/diabetes (yes = 1, no = 0) + 0.99 × AST/ALT ratio – 0.013 × platelet count (× 10^9 per L) – 0.66 × albumin (g per dL); online calculator: http://gihep.com/calculators/hepatology/nafld-fibrosis-score.

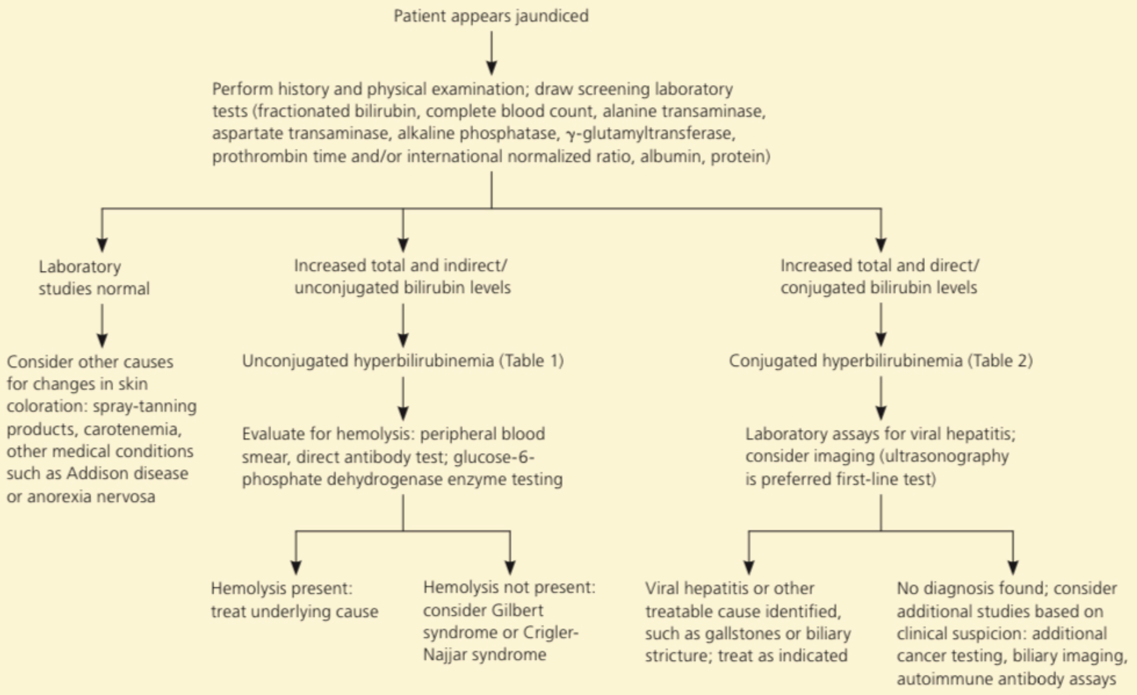
‡—Fibrosis-4 Score: Age (years) × AST (U per L)/[platelet count (× 10^9 per L) × ALT1/2 (U per L)]; online calculator: http://gihep.com/calculators/hepatology/fibrosis-4-score.

§—Complete blood count, liver function tests (i.e., AST, ALT, alkaline phosphatase, total protein, albumin, total bilirubin), A1C level, lipid levels, and NAFLD Fibrosis Score or Fibrosis-4 Score every 12 to 24 months.

Algorithm for evaluation of patients with suspected nonalcoholic fatty liver disease.

Information from references 1, 22, 31, and 32

Evaluation of Jaundice in Adults



Patient appears jaundiced

Perform history and physical examination; draw screening laboratory tests (fractionated bilirubin, complete blood count, alanine transaminase, aspartate transaminase, alkaline phosphatase, γ-glutamyltransferase, prothrombin time and/or international normalized ratio, albumin, protein)

Laboratory studies normal

Consider other causes for changes in skin coloration: spray-tanning products, carotenemia, other medical conditions such as Addison disease or anorexia nervosa

Increased total and indirect/unconjugated bilirubin levels

Unconjugated hyperbilirubinemia (Table 1)

Evaluate for hemolysis: peripheral blood smear, direct antibody test; glucose-6-phosphate dehydrogenase enzyme testing

Hemolysis present: treat underlying cause

Hemolysis not present: consider Gilbert syndrome or Crigler-Najjar syndrome

Increased total and direct/conjugated bilirubin levels

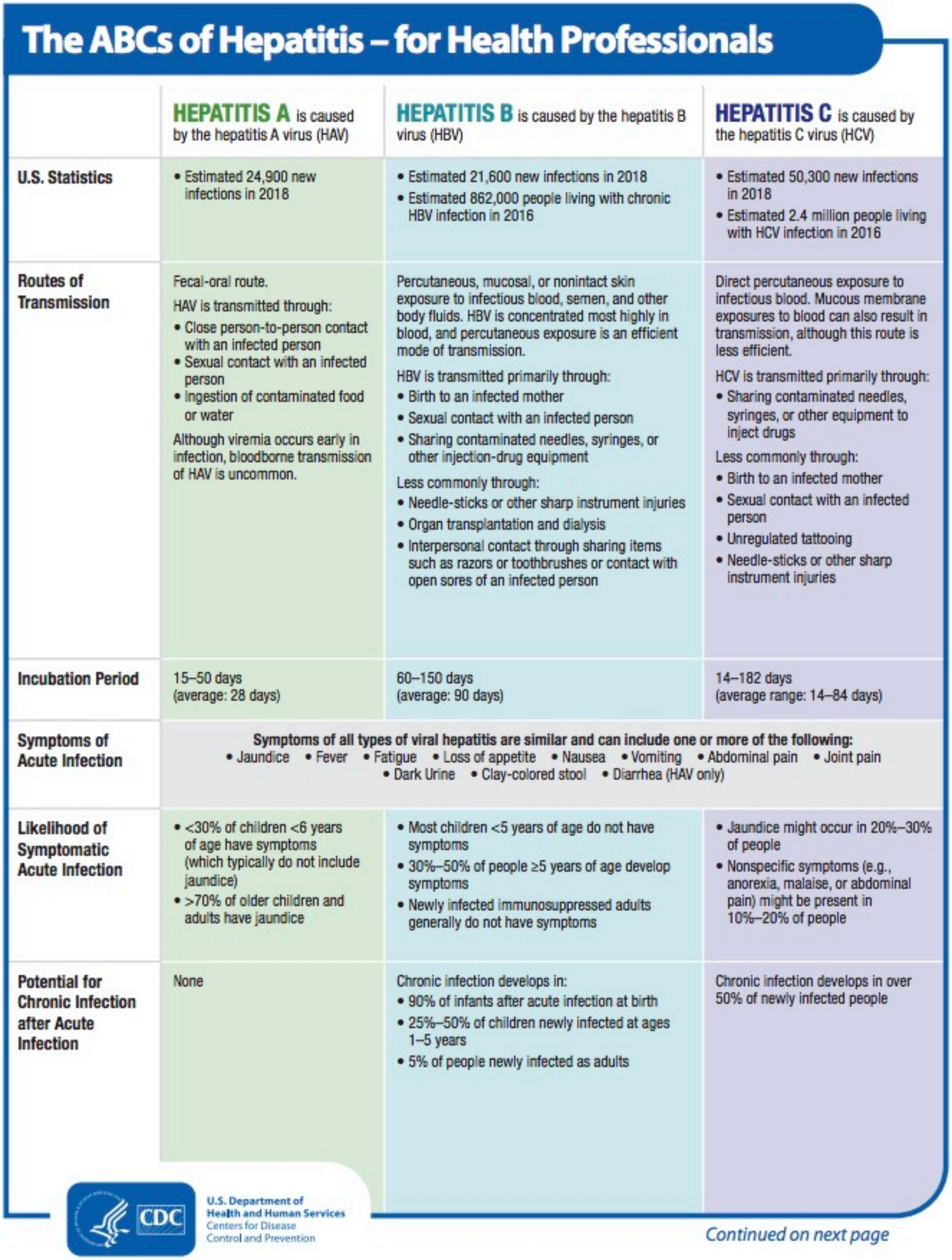
Conjugated hyperbilirubinemia (Table 2)

Laboratory assays for viral hepatitis; consider imaging (ultrasonography is preferred first-line test)

Viral hepatitis or other treatable cause identified, such as gallstones or biliary stricture; treat as indicated

No diagnosis found; consider additional studies based on clinical suspicion: additional cancer testing, biliary imaging, autoimmune antibody assays

Viral Hepatitis



The ABCs of Hepatitis – for Health Professionals

	HEPATITIS A is caused by the hepatitis A virus (HAV)	**HEPATITIS B** is caused by the hepatitis B virus (HBV)	**HEPATITIS C** is caused by the hepatitis C virus (HCV)
U.S. Statistics	• Estimated 24,900 new infections in 2018	• Estimated 21,600 new infections in 2018 • Estimated 862,000 people living with chronic HBV infection in 2016	• Estimated 50,300 new infections in 2018 • Estimated 2.4 million people living with HCV infection in 2016
Routes of Transmission	Fecal-oral route. HAV is transmitted through: • Close person-to-person contact with an infected person • Sexual contact with an infected person • Ingestion of contaminated food or water Although viremia occurs early in infection, bloodborne transmission of HAV is uncommon.	Percutaneous, mucosal, or nonintact skin exposure to infectious blood, semen, and other body fluids. HBV is concentrated most highly in blood, and percutaneous exposure is an efficient mode of transmission. HBV is transmitted primarily through: • Birth to an infected mother • Sexual contact with an infected person • Sharing contaminated needles, syringes, or other injection-drug equipment Less commonly through: • Needle-sticks or other sharp instrument injuries • Organ transplantation and dialysis • Interpersonal contact through sharing items such as razors or toothbrushes or contact with open sores of an infected person	Direct percutaneous exposure to infectious blood. Mucous membrane exposures to blood can also result in transmission, although this route is less efficient. HCV is transmitted primarily through: • Sharing contaminated needles, syringes, or other equipment to inject drugs Less commonly through: • Birth to an infected mother • Sexual contact with an infected person • Unregulated tattooing • Needle-sticks or other sharp instrument injuries
Incubation Period	15–50 days (average: 28 days)	60–150 days (average: 90 days)	14–182 days (average range: 14–84 days)
Symptoms of Acute Infection	**Symptoms of all types of viral hepatitis are similar and can include one or more of the following:** • Jaundice • Fever • Fatigue • Loss of appetite • Nausea • Vomiting • Abdominal pain • Joint pain • Dark Urine • Clay-colored stool • Diarrhea (HAV only)		
Likelihood of Symptomatic Acute Infection	• <30% of children <6 years of age have symptoms (which typically do not include jaundice) • >70% of older children and adults have jaundice	• Most children <5 years of age do not have symptoms • 30%–50% of people ≥5 years of age develop symptoms • Newly infected immunosuppressed adults generally do not have symptoms	• Jaundice might occur in 20%–30% of people • Nonspecific symptoms (e.g., anorexia, malaise, or abdominal pain) might be present in 10%–20% of people
Potential for Chronic Infection after Acute Infection	None	Chronic infection develops in: • 90% of infants after acute infection at birth • 25%–50% of children newly infected at ages 1–5 years • 5% of people newly infected as adults	Chronic infection develops in over 50% of newly infected people

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Continued on next page

	HEPATITIS A	**HEPATITIS B**	**HEPATITIS C**
Severity	• Most people with acute disease recover with no lasting liver damage; death is uncommon but occurs more often among older people and/or those with underlying liver disease	• Most people with acute disease recover with no lasting liver damage; acute illness is rarely fatal • 15%–25% of people with chronic infection develop chronic liver disease, including cirrhosis, liver failure, or liver cancer	• Approximately 5%–25% of persons with chronic hepatitis C will develop cirrhosis over 10–20 years • People with hepatitis C and cirrhosis have a 1%–4% annual risk for hepatocellular carcinoma
Serologic Tests for Acute Infection	• IgM anti-HAV	• HBsAg, plus • IgM anti-HBc	• No serologic marker for acute infection
Serologic Tests for Chronic Infection	• Not applicable—no chronic infection	Tests for chronic infection should include three HBV seromarkers: • HBsAg • anti-HBs • Total anti-HBc	• Assay for anti-HCV • Qualitative and quantitative nucleic acid tests (NAT) to detect and quantify presence of virus (HCV RNA)
Testing Recommendations for Chronic Infection	• Not applicable—no chronic infection Note: testing for past acute infection is generally not recommended	• All pregnant women should be tested for HBsAg during an early prenatal visit in each pregnancy • Infants born to HBsAg-positive mothers (HBsAg and anti-HBs are only recommended) • People born in regions with intermediate and high HBV endemicity (HBsAg prevalence ≥2%) • People born in U.S. not vaccinated as infants whose parents were born in regions with high HBV endemicity (≥8%) • Household or sexual contacts of people who are HBsAg-positive • Men who have sex with men • People who inject, or have injected, drugs • Patients with alanine aminotransferase levels (≥19 IU/L for women and ≥30 IU/L for men) of unknown etiology • People with end-stage renal disease including hemodialysis patients • People receiving immunosuppressive therapy • People with HIV • Donors of blood, plasma, organs, tissues, or semen	• All adults aged 18 years and older, at least once • All pregnant women during each pregnancy • People who currently inject drugs and share needles, syringes, or other drug preparation equipment (routine periodic testing) • People who ever injected drugs • People with HIV • People who receive maintenance hemodialysis (routine periodic testing) • People who ever received maintenance hemodialysis • People with persistently abnormal ALT levels • Prior recipients of transfusions or organ transplants, including: - people who received clotting factor concentrates produced before 1987 - people who received a transfusion of blood or blood components before July 1992 - people who received an organ transplant before July 1992 - people who were notified that they received blood from a donor who later tested positive for HCV infection • Healthcare, emergency medical, and public safety personnel after needle sticks, sharps, or mucosal exposures to HCV positive blood • Children born to mothers with HCV infection • Any person who requests hepatitis C testing should receive it

Continued on next page

	HEPATITIS A	HEPATITIS B	HEPATITIS C
Treatment	• No medication available • Best addressed through supportive treatment	• Acute: no medication available; best addressed through supportive treatment • Chronic: regular monitoring for signs of liver disease progression; antiviral drugs are available	• Acute: AASLD/IDSA recommend treatment of acute HCV without a waiting period • Chronic: over 90% of people with hepatitis C can be cured regardless of HCV genotype with 8–12 weeks of oral therapy
Vaccination Recommendations	**Children** • All children aged 12–23 months • Unvaccinated children and adolescents aged 2–18 years **People at increased risk for HAV infection** • International travelers • Men who have sex with men • People who use injection or noninjection drugs • People with occupational risk for exposure • People who anticipate close personal contact with an international adoptee • People experiencing homelessness **People at increased risk for severe disease from HAV infection** • People with chronic liver disease • People with HIV infection **Other people recommended for vaccination** • Pregnant women at risk for HAV infection or severe outcome from HAV infection • Any person who requests vaccination **Vaccination during outbreaks** • Unvaccinated people in outbreak settings who are at risk for HAV infection or at risk for severe disease from HAV **Implementation strategies for settings providing services to adults** • People in settings that provide services to adults in which a high proportion of those people have risk factors for HAV infection	• All infants • All unvaccinated children and adolescents aged <19 years • Sex partners of HBsAg-positive people • Sexually active people who are not in a mutually monogamous relationship • Anyone seeking evaluation or treatment for a sexually transmitted infection • Men who have sex with men • Anyone with a history of current or recent injection-drug use • Household contacts of people who are HBsAg-positive • Residents and staff of facilities for developmentally disabled people • Health care and public-safety personnel with reasonably-anticipated risk for exposure to blood or blood-contaminated body fluids, • Hemodialysis, predialysis peritoneal dialysis, and home dialysis patients • People with diabetes mellitus aged <60 years and people with diabetes mellitus aged ≥60 years at the discretion of the treating clinician • International travelers to countries with high or intermediate levels of endemic HBV infection (HBsAg prevalence of ≥2%) • People living with hepatitis C • People with chronic liver disease (including cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, and an ALT or AST level greater than twice the upper limit of normal) • People living with HIV infection • People who are incarcerated • Pregnant women who are identified as being at risk for HBV infection during pregnancy • Anyone else seeking long-term protection	• There is no hepatitis C vaccine
Vaccination Schedule	• Single-antigen hepatitis A vaccine: 2 doses given 6–18 months apart depending on manufacturer • Combination HepA-HepB vaccine: typically 3 doses given over a 6-month period	• Infants and children: 3–4 doses given over a 6- to 18-month period depending on vaccine type and schedule • Adults: 2 doses, 1 month apart or 3 doses over a 6-month period (depending on manufacturer)	• No vaccine available

Interpretation of the hepatitis B serologic panel

Tests	Results	Interpretation
HBsAg	Negative	Susceptible
anti-HBc	Negative	
anti-HBs	Negative	
HBsAg	Negative	Immune due to natural infection
anti-HBc	Positive	
anti-HBs	Positive	
HBsAg	Negative	Immune due to hepatitis B vaccination*
anti-HBc	Negative	
anti-HBs	Positive	
HBsAg	Positive	Acutely infected
anti-HBc	Positive	
IgM anti-HBc	Positive	
anti-HBs	Negative	
HBsAg	Positive	Chronically infected
anti-HBc	Positive	
IgM anti-HBc	Negative	
anti-HBs	Negative	
HBsAg	Negative	Four interpretations possible[¶]
anti-HBc	Positive	
anti-HBs	Negative	

Elevated Lever Enzymes
MCQs

ABFM 2022

A 35-year-old female at 36 weeks gestation presents to your office. She reports that for the past few days she has had itching of her palms and soles that has been quite bothersome. She has tried moisturizer with no improvement. A physical examination is unremarkable with no rashes, erythema, or warmth of the palm and soles. The patient otherwise feels well. Which one of the following would be most appropriate at this time?

A. A low-potency corticosteroid cream
B. Tacrolimus topical (Protopic)
C. Cetirizine (Zyrtec Allergy)
D. Bile acid levels
E. A BUN/creatinine ratio

A 40-year-old female presents to your office with jaundice and dark urine. Testing for acute hepatitis A is positive. Her 12-year-old twin boys, who are in good health, have not been vaccinated against hepatitis A or B and are currently asymptomatic. Which one of the following would be the most appropriate postexposure prophylaxis for these children?

A. No prophylaxis
B. Hepatitis A vaccine only
C. Immune globulin only
D. Hepatitis A vaccine and immune globulin

ANSWER: D

Intrahepatic cholestasis of pregnancy (ICP) presents with pruritus of the palms and soles with or without jaundice along with an elevation in serum bile acid concentrations. ICP, which is most common in the late second and/or third trimester, can cause significant risk to the fetus, including fetal death, and is therefore treated aggressively with ursodeoxycholic acid and often early delivery. Corticosteroid creams, tacrolimus, and cetirizine are not appropriate treatments for ICP. Kidney function tests such as a BUN/creatinine ratio would not be initially appropriate in this case.

ANSWER: B

All unvaccinated household contacts and sexual contacts should receive postexposure prophylaxis following significant exposure to hepatitis A within the previous 2 weeks. Healthy individuals 12 months to 40 years of age should receive the hepatitis A vaccine as prophylaxis. Infants younger than 12 months of age should receive immune globulin as postexposure prophylaxis. Individuals >40 years of age, as well as immunocompromised patients, should receive both hepatitis A vaccine and immune globulin. ABFM 2020

A 42-year-old male presents for a routine health maintenance visit and asks about hepatitis C virus (HCV) testing. He reports that he experimented with intravenous drugs in college but never developed a habit. He consumes 1–2 alcoholic drinks a week and is a nonsmoker. He is not married but is in a monogamous, heterosexual relationship. Which one of the following would confirm active hepatitis C infection?

A. Anti-HCV antibody testing
B. AST and ALT levels
C. An AST/platelet ratio index

D. A CBC with differential and peripheral smear
E. HCV RNA polymerase chain reaction testing

ANSWER: E

This patient is at risk for hepatitis C virus (HCV) infection due to his history of intravenous drug use. The initial screening test for HCV is anti-HCV antibody testing, and a positive result could indicate either a prior infection that cleared or an active infection. If the antibody test is positive, HCV RNA polymerase chain reaction testing is the next step to confirm an active infection. AST and ALT levels and a CBC should be obtained if the patient is diagnosed with an active HCV infection. The AST/platelet ratio index is a screening test for hepatic fibrosis and cirrhosis.

ABFM 2021

A 42-year-old male sees you for follow- up after his third episode of pneumonia. He has no other significant medical history. He has never smoked, drinks alcohol occasionally, and has no other drug use or known exposures. A physical examination is normal. Pulmonary function tests demonstrate an FEV1 of 72% of predicted and an FEV1/FVC ratio of 0.68, which does not normalize with bronchodilator administration. A chest radiograph shows hyperinflation but no other significant findings.Laboratory Findings: Platelets: 102,000/mm3 (N 150,000–450,000) Creatinine: 0.7 mg/dL (N 0.6–1.2) AST: 56 U/L (N 8–48) ALT: 43 U/L (N 7–55)Albumin: 3.3g/dL(N3.5–5.0) Which one of the following conditions best explains this patient's abnormal findings?

A. Alpha1-Antitrypsin deficiency
B. Cystic fibrosis
C. Goodpasture syndrome
D. Hereditary hemochromatosis
E. Sarcoidosis

ANSWER: A

This patient is in his forties without clear risk factors and has both an irreversible obstructive pulmonary defect consistent with COPD (FEV1 <80% of predicted and an FEV1/FVC ratio <0.70) and liver abnormalities associated with advanced fibrosis. These combined findings are the hallmark of alpha1-antitrypsin deficiency. This patient has a high likelihood of advanced liver fibrosis based on the low albumin level and noninvasive scoring using the fibrosis-4 (FIB-4) index (age × AST/(platelets [in mm3] × ALT½ = 3.52 for this patient). Further evaluation with transient elastography should be performed to confirm cirrhosis.Cystic fibrosis is less likely to cause a typical obstructive picture on pulmonary function tests (PFTs) anddoes not typically cause liver fibrosis. Goodpasture syndrome is a vasculitis that classically involves the lungs and the kidneys and is more likely to cause a restrictive pattern on PFTs. Hereditary hemochromatosis can cause early liver disease, including cirrhosis, but is not a significant cause of respiratory disease. Sarcoidosis may involve both the lung and the liver, and can cause obstructive or restrictive patterns on PFTs. However, this patient's radiograph did not show the characteristic hilar adenopathy and granulomatous disease of sarcoidosis.

A 67-year-old female with a history of type 2 diabetes, hypertension, osteoarthritis, and hyperlipidemia sees you for follow-up of laboratory results after hepatic steatosis and mild splenomegaly were noted on abdominal ultrasonography performed during a recent emergency department visit for right upper quadrant pain. She is currently asymptomatic. Her vital signs include a blood pressure of 128/72 mm Hg and a BMI of 34 kg/m2 . An examination is significant only for trace bilateral lower extremity edema. A cardiovascular examination is otherwise normal and neurologic and abdominal examinations are normal. Laboratory Findings: Platelets 112,000/mm3 (N 150,000–450,000) Creatinine 0.8 mg/dL (N 0.6–1.2) Hemoglobin A1c 6.6% AST 68 U/L (N 8–48)ALT 55 U/L (N 7–55) Albumin 3.2g/dL(N3.5–5.0) Bilirubin 0.5mg/dL(N0.1–1.2) INR 1.0 (N <1.2). Which one of the following medications should be AVOIDED in this patient to reduce the likelihood of complications of her medical condition?

A. Acetaminophen

B. Atorvastatin (Lipitor)
C. Ibuprofen
D. Lisinopril (Prinivil, Zestril)
E. Metformin (Glucophage)

ANSWER: C

This patient has previously unrecognized compensated hepatic cirrhosis. While the diagnosis of cirrhosis should be confirmed and assessed by methods such as transient elastography, the family physician should recognize this as presumed cirrhosis based on the splenomegaly and laboratory findings. NSAIDs such as ibuprofen should be avoided in patients with cirrhosis due to the risk of renal insufficiency (SOR B). While toxic to the liver at high doses, acetaminophen can be safely used for analgesia in cirrhotic patients, though many hepatologists recommend limiting dosing to 2 g daily (SOR C). Statins can be safely used in compensated cirrhosis and may improve steatosis (SOR A). Lisinopril and metformin can also be used safely, hypertension should not be overtreated as cirrhosis progresses to a decompensated state.

A 61-year-old female comes to your office for a routine health maintenance visit. She brings in laboratory results from a local blood donation facility. She donated blood for the first time in several years but was informed afterward that she is ineligible and should follow up with her primary care physician. She feels well and is asymptomatic. She does not recall receiving the hepatitis B immunization series. The letter she received included the following hepatitis B test results:

Anti-HBc screening test.................................. positive
HBsAg screening test .... negative
HBV nucleic acid test (NAT)........................... negative

You order additional hepatitis B testing, with the following notable results:

Anti-HBs .... 56 mIU/mL (N <10)
Anti-HBc IgM .... non-reactive

Which one of the following is the most likely explanation of these laboratory results?

A. These results indicate a false positive
B. She was never infected with hepatitis B
C. She has an acute hepatitis B infection
D. She has a chronic hepatitis B infection
E. She has recovered from a past hepatitis B infection

ANSWER: E

This patient’s laboratory studies are consistent with a past natural hepatitis B virus (HBV) infection and she is now immune. If she had never been infected her anti-HBc and anti-HBs would both be negative. If she had an acute infection the HBsAg, anti-HBc IgM, and HBV nucleic acid test (NAT) would have all been positive along with the total anti-HBc. If she had a chronic infection the HbsAg and HBV NAT would be positive in addition to the total anti-HBc. Furthermore, the anti-HBs would be negative in both acute and chronic infection since its presence is associated with recovery from infection. If her anti-HBc screening test were a false positive the anti-HBs would be negative.

The U.S. Preventive Services Task Force currently recommends hepatitis C screening for:

A. High-risk adults only, regardless of age
B. Only high-risk adults born between 1945 and 1965
C. Adults born between 1945 and 1965 regardless of risk, and other adults only if they are at high risk
D. Adults born between 1945 and 1980 regardless of risk, and other adults only if they are at high risk
E. All adults <80 years of age, regardless of risk

ANSWER: E

The U.S. Preventive Services Task Force currently recommends that all asymptomatic adults, including pregnant women, between the ages of 18 and 79 without known liver disease should be screened for hepatitis C virus (B recommendation). Others at high risk, including anyone with past or current injection drug use, should also be screened for hepatitis C virus. The prior recommendation was to screen adults born between 1945 and 1965, as well as any other persons at high risk.

A 30-year-old male is diagnosed with hereditary hemochromatosis. Periodic therapeutic phlebotomy may be appropriate to prevent:

A. Chronic liver disease
B. Chronic renal disease
C. Encephalopathy
D. Myelofibrosis
E. Wilson disease

ANSWER: A
Hereditary hemochromatosis is a common inherited disorder of iron metabolism. Iron deposits in the liver may lead to chronic liver disease and hepatocellular cancer. Screening for hereditary hemochromatosis includes serum ferritin levels, a family history, and genetic testing. Chronic renal disease, encephalopathy, myelofibrosis, and Wilson disease (disorder of copper transport) do not result from iron overload.

ABFM 2020

A 42-year-old male sees you because of abnormal laboratory results from a recent health fair. Laboratory Findings, Albumin: 4.1 g/dL (N 3.5–5.5) Alkaline phosphatase: 88 U/L (N 36–92) AST: 152 U/L (N 10–59) ALT:70 U/L (N 13–40) Total bilirubin: 0.9 mg/dL (0.3–1.2) Based on these results, which one of the following is the most likely cause of his elevated liver transaminase levels?

A. Acute viral hepatitis
B. Alcoholic liver disease
C. Cholestasis
D. Nonalcoholic fatty liver disease

ANSWER: B
An AST/ALT ratio >2 is highly suggestive of alcoholic liver disease. Acute viral hepatitis usually presents with AST and ALT levels >25 times the upper limit of normal. Cholestasis is unlikely to be the cause in a patient with normal alkaline phosphatase and bilirubin levels. Although nonalcoholic fatty liver disease is the most common cause of asymptomatic elevated liver transaminase levels in the United States, it is usually associated with an AST/ALT ratio <1.

A patient born in 1954 requests screening for hepatitis C. His anti-HCV antibody screen is positive. Which one of the following would be most appropriate at this point?

A. A confirmatory second anti-HCV test in 4–6 weeks
B. A qualitative HCV RNA test
C. Quantitative HCV genotyping
D. Treatment with a dual antiviral regimen pending additional testing
E. Referral for a percutaneous liver biopsy

ANSWER: B

The CDC recommends that all adults 18 years of age or older receive a one-time screening for hepatitis C virus (HCV). Persons with risk factors for HCV exposure should be screened periodically, based on risk level. If the anti-HCV antibody screen is positive, then a qualitative HCV RNA test is the next step (SOR C). Prior to initiating treatment, a quantitative HCV RNA and genotype testing is necessary (SOR A). In addition, assessing the degree of fibrosis will provide information regarding the urgency of treatment. Percutaneous liver biopsy is generally the preferred evaluation after obtaining quantitative and genotype results, all of which can guide treatment decisions.

ABFM 2019

A 46-year-old male who uses injectable heroin daily presents to establish primary care. He reports no symptoms and feels well overall. He does not smoke cigarettes, use alcohol, or use any drugs other than heroin. He works as an accountant for the federal government and has not had any arrests for illegal activity. In addition to assessing his readiness for treatment of his addiction, you should order testing for:

A. HIV only
B. HIV, hepatitis B, and hepatitis C
C. HIV, hepatitis B, hepatitis C, and TB
D. HIV, hepatitis A, hepatitis B, hepatitis C, and TB
E. HIV, hepatitis A, hepatitis B, hepatitis C, TB, gonorrhea, and Chlamydia

ANSWER: D

Persons who inject drugs are at increased risk for HIV, hepatitis A, hepatitis B, hepatitis C, and latent tuberculosis. These patients should be screened at the initial visit and treated for any conditions found, according to routine guidelines. If titers are low or absent for hepatitis A or B, the patient should be vaccinated. Although gonorrhea and Chlamydia screening is recommended for females under 25 years of age who use injectable drugs, it is not appropriate in this asymptomatic patient.

A 56-year-old male with a history of hepatitis C cirrhosis is admitted to the hospital with gastrointestinal (GI) bleeding. The patient has been stable, taking only furosemide (Lasix) and spironolactone (Aldactone). Upper GI endoscopy confirms variceal bleeding and the gastroenterologist performs appropriate variceal banding. A nurse calls you because laboratory studies that were ordered in the emergency department reveal a serum ammonia level of 120 g/dL (N 39–90). The patient has no signs of confusion, insomnia, or decreased mental alertness. A physical examination reveals mild ascites but no other abnormalities. Which one of the following would be most appropriate for addressing the elevated ammonia level?

A. No additional treatment
B. Lactulose (Kristalose)
C. Methotrexate
D. Neomycin
E. Prednisone

ANSWER: A

Elevated ammonia levels may occur with urea cycle disorders, portosystemic shunting, urinary tract infection from urease-producing organisms, gastrointestinal bleeding, shock, renal disease, heavy exercise, smoking, parenteral nutrition, salicylate intoxication, use of medications including diuretics, and alcohol use. In patients with chronic liver disease, hepatic encephalopathy is diagnosed based on the overall clinical presentation and not on ammonia levels. A normal ammonia level does not exclude the diagnosis of hepatic encephalopathy, nor does an elevated ammonia level establish the diagnosis. This patient had an elevated serum ammonia level that was found incidentally during his hospital admission for gastrointestinal bleeding. Because there was no clinically significant encephalopathy, treatment based on ammonia levels is not indicated. The patient's elevated ammonia level was probably from diuretic use. Lactulose, methotrexate, neomycin, or prednisone would not be appropriate.

An adult male sees you for follow-up of metabolic syndrome associated with type 2 diabetes and hyperlipidemia. Routine laboratory findings include an AST level of 73 U/L (N 10–59) and an ALT level of 62 U/L (N 13–40). These levels are persistently elevated 3 months later. He states that he drinks 1–2 glasses of wine per week and does not use acetaminophen. His medications include metformin (Glucophage) and atorvastatin (Lipitor). Which one of the following would be most appropriate at this point?

A. Discontinue atorvastatin
B. Discontinue metformin
C. Screen for hepatitis and hemochromatosis
D. Order CT of the abdomen
E. Refer for a liver biopsy

ANSWER: C

This patient most likely has nonalcoholic fatty liver disease (NAFLD). The initial evaluation should include studies to rule out uncommon, but not rare, causes of liver disease. This would include viral hepatitis studies, iron studies for hemochromatosis, serum albumin levels, and a CBC. Discontinuing statin therapy is generally not necessary because statins have been shown to be safe for patients with chronic liver disease. Metformin is not commonly associated with elevated transaminases. If NAFLD is determined to be the most likely cause, an NAFLD fibrosis score should be calculated to preclude the need for a liver biopsy.

ABFM 2018

A 58-year-old male sees you for a routine health maintenance visit. He has a 15-pack-year smoking history and proudly tells you that he quit "for good" 1 year ago. You congratulate him on this accomplishment and encourage him to continue to abstain from tobacco. He has not seen a physician for 20 years. U.S. Preventive Services Task Force recommendations for this patient include which one of the following?

A. Abdominal aortic aneurysm screening
B. Fall prevention screening
C. Hepatitis C screening
D. Lung cancer screening with low-dose CT

ANSWER: C

The U.S. Preventive Services Task Force (USPSTF) recommends one-time screening for hepatitis C virus infection for adults born between 1945 and 1965. Abdominal aortic aneurysm screening with ultrasonography is recommended for men 65–75 years of age who have any history of smoking. The USPSTF recommends annual screening for lung cancer with low-dose CT in adults 55–80 years of age who have a 30-pack-year smoking history and currently smoke or have quit within the past 15 years (2021 update) . Fall risk screening is recommended in community-dwelling adults 65 years of age or older.

A 35-year-old male has a negative past medical history and a normal physical examination. He reports that he smokes half a pack of cigarettes per day and has 3–4 beers per week. A comprehensive metabolic panel reveals an ALT (SGPT) of 30 U/L (N 10–40) and an AST (SGOT) of 84 U/L (N 10–30). The remaining laboratory studies are negative. There is no family history of liver disease. The laboratory findings suggest which one of the following.

A. Hepatitis C
B. Hemochromatosis
C. Gilbert syndrome
D. Alcoholic liver disease
E. Nonalcoholic liver disease

ANSWER: D

An AST (SGOT) to ALT (SGPT) ratio greater than 2:1 suggests alcoholic liver disease, and a ratio of 3:1 or higher is highly suggestive of alcoholic liver disease. With most hepatocellular disorders, including nonalcoholic fatty liver disease, viral hepatitis, and iron overload disorder, the patient will have an AST to ALT ratio <1.

A 62-year-old female presents for a health maintenance visit. She is interested in staying up to date on her preventive care recommendations. She smoked for 4 years during college. Her BMI is 23.0 kg/m2. She feels well and does not have any specific health concerns. She had a colonoscopy 4 years ago and no polyps were found. A screening mammogram 6 months ago was normal. Which one of the following screening measures is recommended by the U.S. Preventive Services Task Force for this patient?

A. A urinalysis to detect asymptomatic bacteriuria
B. Measurement of hemoglobin A1c
C. Screening for hepatitis A and B viruses
D. Screening for hepatitis C virus
E. Lung cancer screening with low-dose CT of the lungs without contrast

ANSWER: D

The U.S. Preventive Services Task Force recommends screening for hepatitis C virus (HCV) infection in adults aged 18 to 79 years (2020 update). The USPSTF recommends screening for hepatitis B virus (HBV) infection in adolescents and adults at increased risk for infection (2020 update). This patient has a normal weight so diabetes screening is not recommended. Screening for asymptomatic bacteriuria is not recommended in none pregnant patients. There is no recommendation for screening hepatitis A.

A 30-year-old male presents with intermittent right upper quadrant pain after meals. He has been in moderate pain for the past 3 hours. On examination the patient's vital signs are normal except for a temperature of 39.2°C (102.6°F). He appears toxic. Examination of the abdomen reveals a positive Laboratory Findings:

WBCs	3000/mm3 (N 4300–10,800)
ALT (SGPT)	132 U/L (N 10–55)
AST (SGOT)	123 U/L (N 9–25)
Alkaline phosphatase	200 U/L (N 45–115)
Bilirubin	2.6 mg/dL (N 0.0–1.0)
Lipase	15 U/dL (N 3–19)

Ultrasonography reveals cholelithiasis. Other findings include an enlarged gallbladder, thickening of the gallbladder wall, and a common bile duct diameter of 11 mm. Which one of the following is the most likely cause of this patient's symptoms?

A. Acute cholangitis
B. Acute viral hepatitis
C. Cholangiocarcinoma

D. Gallstone pancreatitis

ANSWER: A

Gallstones are often asymptomatic and found incidentally on imaging. However, they may become symptomatic, which usually causes pain in the right upper quadrant or epigastrium. Most patients with symptomatic gallstones present with chronic cholecystitis, which causes recurrent attacks of pain. The pain is constant, increases in severity at the beginning, and lasts from 1 to 5 hours. It often starts during the night after a fatty meal and may be associated with nausea and vomiting. Abdominal ultrasonography is the initial imaging method. The two main complications of choledochal stones are cholangitis and pancreatitis. Acute cholangitis is a bacterial infection. Bacterial growth is enhanced by obstruction of the duct. It may present as a mild self-limited disease but can also lead to sepsis. Cases typically present with fever, pain, and jaundice. Laboratory findings include an elevated WBC count and elevated bilirubin, transaminases, and alkaline phosphatase. Ultrasonography will show a dilated bile duct in many cases, although it might not be dilated in acute obstruction. Patients with pancreatitis present with pain, nausea, and vomiting. The pain is usually epigastric and radiates to the back. It reaches its maximum intensity within 1 hour and may last for days. The physical examination may reveal tachycardia, hypotension, tachypnea, and fever. The abdomen may be distended and is typically tender to palpation. The diagnosis requires two of three primary features: abdominal pain, elevation of serum amylase or lipase, and findings on imaging studies that are consistent with the diagnosis. Ultrasonography can show pancreatic enlargement or edema, and visualization of gallstones will suggest choledocholithiasis as the cause of the pancreatitis.

ABFM 2017

A 38-year-old healthy female comes to your office for preventive care. Her medical history is significant only for nephrolithiasis and controlled hypothyroidism. Her sexual history is significant for vaginal intercourse with three male partners in the past year, including her current partner who uses intravenous heroin. She has no fever, sore throat, swollen nodes, or other signs of acute illness. A fourth-generation HIV antibody/antigen test is negative, and her serum creatinine level is 0.6 mg/dL (N 0.5–1.1). Which one of the following additional test results must be documented before offering preexposure prophylaxis for HIV with emtricitabine/tenofovir (Truvada)?

A. Hepatitis B surface antibody and antigen
B. Hepatitis C antibody
C. Liver enzymes
D. HIV viral load
E. Her sexual partner's HIV status

ANSWER: A

Emtricitabine/tenofovir is the only currently approved regimen shown to be effective for HIV preexposure prophylaxis (PrEP) (SOR A). This patient has multiple sexual partners, including one at high risk for HIV infection due to intravenous drug use, and thus should be offered PrEP (SOR C). In patients without signs of acute HIV, PrEP may be initiated after documentation of negative fourth-generation HIV antibody/antigen testing, normal renal function, and hepatitis B infection and immunization status. Tenofovir can be toxic to the kidneys and is not recommended in patients with an estimated glomerular filtration rate <60 mL/min/1.73 m2. Emtricitabine and tenofovir are both also active against hepatitis B virus (HBV) infection, so the use of PrEP in patients with active HBV must be carefully considered. If a patient with active HBV stops taking PrEP, reactivated HBV can cause liver damage. Patients susceptible to HBV infection should be immunized. Hepatitis C testing would be prudent in this case, but the results are not needed to begin therapy with emtricitabine/tenofovir.

A 66-year-old male with nonalcoholic steatohepatitis, hyperlipidemia, and hypertension sees you for follow-up. He was recently diagnosed with cirrhosis. He has no new health complaints today. His medications include metoprolol, simvastatin (Zocor), and low-dose aspirin. His vital signs include a blood pressure of 120/75 mm Hg, a heart rate of 72 beats/min, and an oxygen saturation of 96% on room air. The physical examination is notable for mild ascites and trace lower extremity edema Which one of the following recommendations would be most appropriate for this patient?

A. Fluid restriction
B. Limiting sodium intake
C. A low-protein diet
D. Discontinuation of metoprolol
E. Discontinuation of simvastatin

ANSWER: B
Dietary counseling is key in the management of cirrhosis. Patients with ascites should be limited to 2000 mg of sodium daily (SOR A). Fluid restriction is not recommended unless the serum sodium level is <120 mEq/L, and it is extremely difficult to achieve. Patients would need to limit fluid intake to less than their urinary output, which is often reduced. Up to 60% of patients with cirrhosis suffer from malnutrition, so a high-protein diet is recommended (1.0–1.5 g/kg dry body weight). High-protein diets are tolerated well and result in improved mental status (SOR B). Protein restriction does not benefit those with hepatic encephalopathy.
β-Blockers should be stopped when the patient’s mean arterial pressure is <82 mm Hg (blood pressure 100/73 mm Hg) (SOR B). β -Blockers are used in early cirrhosis for hypertension, reducing portal pressures, and prevention of varices. They are no longer effective when the patient becomes hypotensive or has refractory ascites, spontaneous bacterial peritonitis, or other conditions associated with significant changes in hemodynamic status. This patient is normotensive on his current dosage of metoprolol. As his cirrhosis progresses the metoprolol will likely need to be discontinued. Statins can be safely used in patients with cirrhosis. Their cardiovascular benefits are well established, and the risk of associated liver failure is extremely low (SOR A).

An otherwise healthy 32-year-old female sees you for a routine health maintenance examination after having required laboratory screening at work. She has no significant past medical history and the physical examination is normal. Laboratory results are unremarkable except for an elevated alkaline phosphatase level. Which one of the following would be most appropriate at this point?

A. A gamma-glutamyl transferase level
B. A parathyroid hormone levels
C. Hepatitis C antibody testing
D. Ultrasonography of the liver
E. Bone scintigraphy

Answer: D
When an otherwise healthy patient’s alkaline phosphatase level is elevated, it is helpful to determine whether the source of elevated isoenzymes is the liver or bone. One method is fractionation of the alkaline phosphatase by electrophoresis. A gamma-glutamyl transferase or 5 -nucleotidase level can also indicate whether the elevation of the alkaline phosphatase is from the liver. These enzymes are rarely elevated in conditions other than liver disease. Severe vitamin D deficiency can lead to osteomalacia with an elevated alkaline phosphatase.

A 55-year-old male presents with shortness of breath and abdominal pain. He has a history of diabetes mellitus, coronary artery disease, and hepatitis C. He usually is very active and continues to work at a steel plant. He smokes 1 pack of cigarettes each day and drinks alcohol daily. A chest radiograph shows a moderate right-sided pleural effusion. Thoracentesis reveals a pleural fluid protein to serum protein ratio of 0.3, and a pleural LDH to serum LDH ratio of 0.4.

The pleural glucose level is 140 mg/dL and his serum glucose level are 150 mg/dL. Which one of the following is the most likely cause of this pleural effusion?

A. Asbestosis
B. Cirrhosis with ascites
C. Malignancy
D. Pneumonia
E. Viral illness

ANSWER: B

Evaluation of the pleural fluid is important to assist in determining the cause of the effusion. Protein, glucose, LDH, and cell counts should be measured in the pleural fluid. This can help determine if the effusion is exudative or transudative. A pleural protein to serum protein ratio >0.5 or a pleural fluid LDH to serum LDH ratio >0.6 suggests an exudative effusion. Lower ratios suggest a transudative process. With transudates, the pleural fluid pH is typically between 7.40 and 7.55, with fewer than 1000 WBCs, and the glucose level is similar to the serum glucose level. Cirrhosis with ascites is a cause of transudative effusion. Pleural effusions associated with malignancy, pneumonia, viral illness, and asbestosis tend to be exudative.

A 55-year-old female with hypertension sees you for a routine follow-up visit. A physical examination is normal except for a BMI of 34.0 kg/m2. Laboratory findings are notable for an ALT (SGPT) of 53 U/L (N 7–35), and an AST (SGOT) of 28 U/L (N 10–34). She had a similar elevation a month ago when she was seen in the emergency department. Her comprehensive metabolic panel is otherwise normal, and a CBC is also normal. She has had negative hepatitis B surface antigen and hepatitis C antibody testing in the past. She does not drink alcohol or take medications that affect liver function. Which one of the following is the most appropriate test for evaluating this patient?

A. Anti–smooth muscle antibody
B. Ceruloplasmin
C. Hepatitis D antibody
D. Iron studies
E. A liver biopsy

ANSWER: D

This patient is obese and has an isolated elevation of ALT. The initial history and workup, including testing for chronic hepatitis, a medication review, and alcohol screening, have all been conducted. Current guidelines suggest iron studies to screen for hemochromatosis as part of the initial evaluation (SOR C). Anti–smooth-muscle antibody and ceruloplasmin levels can detect more rare causes of hepatocyte inflammation (autoimmune hepatitis and copper deposition from Wilson's disease). These tests can be considered in persistent transaminitis based on clinical judgment (SOR C). Hepatitis D is a superinfection seen in patients with hepatitis B, and is not a consideration in this patient. A liver biopsy may also be considered in persistent transaminitis, especially in the setting of clinical or serologic evidence of advanced liver fibrosis, but is not recommended at this stage (SOR C). Patients with fatty liver disease are at increased risk for developing liver cirrhosis.

A 26-year-old male who is in a monogamous sexual relationship with another male sees you for a routine health maintenance visit. He is employed in a grocery store, is in good health, and reports having the usual immunizations as a child. Based on expert consensus, which one of the following would be most appropriate at this visit?

A. Pre-exposure HIV prophylaxis
B. Screening for STIs now and every 3 months

C. Meningococcal vaccine
D. Hepatitis B surface antigen (HBsAG) testing

ANSWER: D

Men who have sex with men but are in a monogamous relationship need not be offered preexposure or postexposure HIV prophylaxis, unlike men with multiple or anonymous sexual partners. Meningococcal vaccine is not indicated unless there are other risk factors. Since this patient is in a monogamous relationship, screening for sexually transmitted infections once a year is considered adequate. Screening for hepatitis C at this visit is recommended, as well as testing for hepatitis B infection.

Screening for chronic hepatitis B infection is NOT recommended for which one of the following?

A. Patients on chronic immunosuppressive therapy
B. Patients with end-stage renal disease who are on hemodialysis
C. Household contacts of individuals with chronic hepatitis B
D. Pregnant women with no risk factors for hepatitis B
E. All newborns

ANSWER: E

Worldwide, hepatitis B is a common cause of liver failure, cirrhosis, and hepatocellular carcinoma. The disease characteristically is asymptomatic before such complications develop. Although routine infant vaccination against hepatitis B has greatly decreased the incidence of this infection in the United States, it remains a significant cause of morbidity and mortality both in the United States and globally. Identifying persons infected with hepatitis B allows vaccination of their household contacts and sexual partners, thereby preventing further transmission. It also allows for medical treatment of infected individuals, including antiviral therapy and monitoring for the development of cirrhosis or hepatocellular carcinoma. The CDC recommends screening for hepatitis B in patients on hemodialysis, household contacts of individuals with chronic hepatitis B, patients on immunosuppressive therapy, and all pregnant women. Other individuals who should be screened include anyone exposed to bodily fluids of infected individuals, such as sexual partners or infants of infected mothers. Behavioral risks such as intravenous drug use is also an indication for screening. Patients from areas where HBsAg prevalence is >2% should also be screened.

ABFM 2014

A 52-year-old female with morbid obesity is incidentally noted to have mildly elevated AST (SGOT) levels. She does not consume alcohol and denies using recreational drugs. A workup for chronic viral hepatitis and hemochromatosis is negative. Which one of the following is most likely to improve her hepatic condition?

A. Pentoxifylline
B. Simvastatin (Zocor)
C. L-carnitine
D. Vitamin E
E. Weight loss

ANSWER: E

Nonalcoholic fatty liver disease is characterized by the accumulation of fat in hepatocytes. It is associated with insulin resistance, central adiposity, increased BMI, hypertension, and dyslipidemia. An incidentally discovered elevated AST level in the absence of alcohol or drug-induced liver disease strongly suggests the presence of nonalcoholic fatty liver disease. The goal of therapy is to prevent or reverse hepatic injury and fibrosis. Diabetes mellitus, hypertension, dyslipidemia, and other comorbid conditions should be appropriately managed. A healthy diet, weight loss, and exercise are first-line therapeutic measures to reduce insulin resistance in patients with nonalcoholic fatty liver disease. Weight loss has been shown to both normalize AST levels and improve hepatic histology. Vitamin E has been shown to improve AST levels but has no impact on liver histology, and pentoxifylline, simvastatin, and L-carnitine have not been shown to consistently improve either AST levels or liver histology (SOR B).

ABFM 2012

A 52-year-old African-American male sees you for a routine visit. His only medical problem is hypercholesterolemia. Because you wish to initiate a statin, you order a liver profile with the. following results:

Total bilirubin - 2.0 mg/dL (N 0.0–1.0)
Direct bilirubin - 0.2 mg/dL (N 0.0–0.4)
Albumin - 4.0 g/dL (N 3.5–5.0)
LDH - 250 U/L (N 45–90)
AST (SGOT) - 25 U/L (N 7–27)
ALT (SGPT) - 15 U/L (N 1–21)
Alkaline phosphatase - 25 U/L (N 13–39)

Which one of the following would best explain these results?

A. Alcoholic hepatitis
B. Steatohepatitis
C. Chronic hepatitis C
D. Hemolysis
E. Gilbert's syndrome

ANSWER: D

The combination of elevated LDH and elevated unconjugated bilirubin with otherwise normal liver enzyme levels suggests hemolysis. Gilbert's syndrome would not explain the LDH elevation. Hepatitis is unlikely with normal transaminase levels.

Pre Test 4th Edition

You are examining a normal-term newborn whose mother is hepatitis B virus (HBV) surface antigen positive. Which of the following protocols is recommended for the child?

A. Hepatitis B vaccination at 0 to 2 months, a second dose at 1 to 4 months, and a third dose at 6 to 18 months of age.
B. Hepatitis B vaccination within 12 hours of birth, with the timing of the second and third doses based on the mother's hepatitis B viral load at the time of delivery.
C. Hepatitis B vaccination and hepatitis B immune globulin within 12 hours of birth, a second dose of hepatitis B vaccine at 1 to 2 months, and a third dose of vaccine at 6 months.
D. Hepatitis B vaccination and hepatitis B immune globulin within 12 hours of birth, a second dose of the vaccine and immune globulin at 1 to 2 months, and a third dose of the vaccine and immune globulin at 6 months.
E. Hepatitis B vaccination at birth, with serologic testing of the baby before additional vaccinations are given.

ANSWER: C

Hepatitis B infects approximately 1.25 million people in the United States and more than 450 million people globally. It is transmitted more efficiently than hepatitis C or HIV, and the likelihood of transmission increases with the level of HBV DNA in the serum. In high-prevalence areas, hepatitis B is most often vertically transmitted, but because of screening and immunization practices, it's most often transmitted horizontally in the United States. Young age is a risk factor for the development of chronic hepatitis B, with more than 90% of children who contract the disease before 5 years of age developing chronic disease. Studies have shown that compared to no intervention, treating the infant of a hepatitis B-positive mother with hepatitis B immune globulin within 12 hours of birth, and vaccination, substantially reduces the transmission rate. Therefore, all mothers should be screened for hepatitis B surface antigen, and if positive, the babies should be treated as described in this question. If the hepatitis status of the mother is unknown, the child should get the vaccine, and the mother should be tested. If the mother is found to be positive, the baby should receive immune globulin within 7 days.

You are evaluating a 48-year-old man with liver disease. His laboratory evaluation is as follows:
AST 268 U/L (high)
ALT 114 U/L (high)
Alkaline phosphatase 140 U/L (high)
Bilirubin 2.3 mg/dL (high)
GGT 220 U/L (high)
Which of the following is the most likely cause of his liver disease?

A. Autoimmune hepatitis
B. Hepatitis B
C. Hepatitis C
D. Hemochromatosis
E. Alcoholic hepatitis

ANSWER:E

Determining the cause of liver disease has important implications for treatment. The most important aspect of diagnosing alcoholic liver disease is the documentation of chronic alcohol abuse. However, alcohol use is sometimes denied by the patient. Alcoholic hepatitis is associated with the classic laboratory findings of a disproportionate elevation of AST compared to ALT with both values usually being less than 300 IU/L. This ratio is generally greater than 2.0, a value rarely seen in other forms of liverdisease, including those listed in this question (viral or autoimmune hepatitis or hematochromatosis). In alcoholic liver disease, the GGT is elevated, often to more than eight times the upper limit of normal.

You are evaluatinga 45-year-old man with liver disease. His laboratory evaluation reveals the following: AST 52 U/L (high) ALT 56 U/L (high) Alkaline phosphatase 132 U/L (high) GGT 188 U/L (high) Albumin 2.9 g/dL (low) Bilirubin 3.5 mg/dL (high) Prothrombin time 14.9 seconds (high). Which of his laboratory results suggests that his liver disease is chronic?

A. AST
B. ALT
C. GGT
D. Alkaline phosphatase
E. Albumin

ANSWER:E

Laboratory studies that represent acute hepatocellular injury include AST, ALT, LDH, and alkaline phosphatase. Laboratory values that represent hepatic function include albumin, bilirubin, and prothrombin time. Tests of hepatic function are more suggestive of chronic disease as opposed to acute injury.

You care for a patient who contracted hepatitis C after a blood transfusion many years ago. Her liver disease has progressed, and she now has end-stage disease. Which of the following will be the most likely cause of death in this patient?

A. Liver failure
B. Hepatocellular carcinoma
C. Bleeding varices
D. Encephalopathy
E. Renal failure

ANSWER: C

Patients with untreated, chronic hepatitis C are at risk for progression to cirrhosis. In cirrhotic patients, varices occur secondary to chronic high pressure in the portal veins. Bleeding from varices is the most common cause of death in cirrhotic patients. The other potential causes of death listed are less common. Hepatocellular carcinoma occurs at a rate of about 3% to 5% per year in patients with cirrhosis from hepatitis C.

You are taking care of a 47-year-old woman with hypertension, diabetes, and dyslipidemia. Her examination shows a mild hepatomegaly and her laboratory studies reveal the following: AST 120 U/L (normal is 10-40 U/L) ALT 154 U/L (normal is 7 – 56 U/L) Alkaline phosphatase 140 IU/L (normal is 44-147 IU/L) Bilirubin 1.2 mg / dl (normal 0.3 -1 mg/dL) GGT 61 U/L (normal 9-48 U/L). She denies alcohol use or abuse. You presume nonalcoholic fatty liver disease (NAFLD).Which of the following is indicated?

A. Recommend a family intervention to help her admit to alcohol abuse
B. More aggressive treatment of her diabetes
C. Consider interferon therapy
D. Consider ribavirin treatment
E. Consider a direct-acting antibody drug (simeprevir or sofosbuvir)

ANSWER:B

NAFLD is a relatively recently described condition, but is the most common liver disease in the United States. It encompasses a wide spectrum of disease, with liver histology being similar to patients with hepatitis related to alcohol, but without the requisite history. For some reason, this condition impacts women more than men. It may be part of "syndrome X" that includes obesity, diabetes mellitus, dyslipidemia, and hypertension. Seventy-five percent of people will have hepatomegaly on clinical examination, with a smaller percentage (25%) demonstrating splenomegaly. Although there are no pathognomonic laboratory markers, elevations of AST and ALT are common withan AST:ALT ratio of less than 1. Evidence of steatosis may be seen on a hepatic ultrasound. Treatment for this condition includes weight reduction, treatment of diabetes, and treatment of lipid disorders. There is no current evidence that supports any specific pharmacologic therapy.

You are caring for a 26-year-old gay man who recently went to the local health department for anonymous HIV testing. His test was positive, and he is following up with you for initial laboratory testing and recommendations onnext steps. As part of his initial testing, you find his CD4 count to be 388 cells/mm3 and his viral load is below 10,000 copies/mL.During his initial laboratory workup, you identify that he is Hepatitis A and Hepatitis B virus nonimmune. What should you recommend?

A. No vaccinations should be given to this patient.
B. The patient should be vaccinated against Hepatitis A, but not Hepatitis B.
C. The patient should be vaccinated against Hepatitis B, but not Hepatitis A.
D. The patient should be vaccinated against both Hepatitis A and B.
E. The patient should be given immune globulin.

ANSWER :D

In the United States, an estimated 1.2 million people are living with HIV disease, and approximately 20% of these individuals do not know their HIV status. Worldwide, AIDS is now the leading cause of death for persons aged 15 to 59 years. In some African countries, HIV is such a problem that average life expectancy has been reduced by more than 20 years. When a person is newly diagnosed with HIV, a complete physical examination and laboratory assessment should be conducted. A CD4 count should be done at the initial visit, then every 3 to 6 months after. A plasma HIV RNA (viral load) should be done at the initial visit, before starting antiretroviral therapy (ART), and every 3 months while on ART. A full hepatitis panel should be conducted on all newly diagnosed patients, and if the patient is found to be Hepatitis A and/or Hepatitis B nonimmune, vaccination is indicated.

You are caring for a 23-year-old pregnant patient (G0P0) with an active substance use disorder. She has actively injected heroin during this pregnancy and presents for her first prenatal visit at 18 weeks' gestation. Initial physical examination is normal, the baby has normal fetal heart tones and activity,and mom is well-appearing but has mild symptoms of withdrawal. She was last seen 13 months ago in your clinic and received her first dose of hepatitis B vaccine. Regarding hepatitis B testing and vaccination, what would be the most appropriate action?

A. Re-administer the first dose of hepatitis B vaccine now without serologic testing since the schedule has been interrupted.
B. Administer the second dose of hepatitis B vaccine now prior to serologic testing.
C. Counsel the patient regarding the need to complete this series and recommend she receive it after she delivers.
D. Order serologic testing for hepatitis and administer the vaccine only if her HBsAg is negative.
E. Administer the second dose of hepatitis vaccine immediately after obtaining serologic testing for hepatitis.

ANSWER: E

The dosing schedule for HBV vaccination is 0, 1, and 6 months. When the second or third dose is delayed, there is no need to restart the series and the subsequent dose can be administered as long as there is an 8-week gap between the second and third dose of vaccine. The vaccine is not a live virus, so it can be administered to pregnant or lactating women. Routine prenatal care does not call for administration of hepatitis B vaccine, but women who are at high risk for hepatitis B should be vaccinated, including women who are being evaluated or treated for a sexually transmitted infection (STI), have recent or current injection-drug use, have had a hepatitis B virus surface antigen (HBsAg)-positive sexual partner, or have had more than one sexual partner in the past 6 months. It is recommended that administration of the HBV vaccine in any high-risk patient occur immediately after serologic testing is obtained and counseling is provided. Waiting for serology is not necessary as duplicate immunization is not associated with adverse events nor is the presence of past or current infection. However, some patients with risk factors for HBV are at risk for not following up and waiting may result in a failure of the patient to receive appropriate vaccination.

You are caring for a 27-year-old healthy gay man who works as an accountant and lives alone. He had the "typical childhood vaccinations" and provides documentation of his immunization record. He is up-to-date on tetanus, and was primarily immunized against diphtheria, pertussis, polio, hepatitis B, measles, mumps, rubella, and H influenzae type b. Which of the following vaccinations is indicated for this patient?

A. Human papillomavirus (HPV)
B. Meningococcus
C. Hepatitis A
D. Pneumococcus
E. A booster of the measles-mumps-rubella (MMR) vaccine

ANSWER : C

Hepatitis A vaccination is indicated for men who have sex with men orusers of injection drugs. Occupational indications include persons working with hepatitis Avirus (HAV)-infected primates or with HAV in a research laboratory setting. Medicalindications include chronic liver disease and persons that receive clotting factor concentrates.The HPV vaccine is recommended for gay, bisexual, and other men who have sex with menthrough the age of 26. Meningitis vaccination is indicated for those with functional asplenia,travelers to endemic areas, or those within an area of identified outbreak. College studentscan be counseled about the vaccination, especially if they are living in a dormitory.Pneumococcal vaccination is only indicated for those with chronic diseases, functionalasplenia, smokers, or residents of long-term care facilities. An MMR booster is not indicated.

A 45-year-old woman comes to your office after her husband noticed that her "skin turned yellow." She reported "flu symptoms" a couple of weeks ago, with weakness, loss of appetite, nausea, and abdominal pain for 2 days. She has felt better since, but noted the skin discoloration yesterday. On examination, her skin tone, conjunctivae, and mucous membranes are yellow-tinged. Serologies indicate acute hepatitis A infection. Which of thefollowing is true about this infection?

A. She is most infectious while she is jaundiced.
B. Most infected adults are asymptomatic.
C. This infection never results in chronic hepatitis.
D. Relapses are common.
E. Fecal shedding of the virus continues until liver enzymes have normalized.

ANSWER:C

Hepatitis A is the most commonly reported hepatitis virus. It is spread via the fecal-oral route, most commonly through the ingestion of contaminated food or water. Hepatitis A causes acute hepatitis only and never results in chronic hepatitis. Lifelong immunity is expected for all patients that recover, therefore relapses are uncommon. Fecal shedding of the virus occurs early, and declines once jaundice develops. When patients are jaundiced, they are less infectious than during the prodrome. Symptoms of infection change with age. Ninety percent of those infected before the age of 10 years are asymptomatic, but up to 70% of infected adults have symptoms.

You are examining a newborn whose mother has a positive screen for hepatitis B surface antigen (HBsAg). Which of the following is true regarding this situation?

A. When acquired early in life, the large majority of those infected with hepatitis B will have chronic disease.
B. If the child has a normal immune system, his likelihood of developing chronic disease is small.
C. A higher percentage of adults infected with hepatitis B will develop chronic disease as compared with children.
D. A high percentage of children acutely infected will develop fulminant liver disease.
E. When hepatitis B is transmitted perinatally, the child generally develops the typical symptoms of acute hepatitis.

ANSWER: A

Transmission of hepatitis B may occur through the transfer of blood or body fluids, but can also occur perinatally (vertical transmission). If the virus is acquired early in life, the infection is silent, but up to 90% of those infected develop chronic disease. Those with a compromised immune system may also develop chronic disease easier than healthy patients. Healthy adults infected have spontaneous resolution more than 95% of the time. As with infection with hepatitis A, less than of 1% those infected will develop fulminant liver disease.

You are following a patient after an acute hepatitis B infection. His serologies are as shown:
HBsAg: Positive

HBeAg: Positive
IgM anti-HBc: Negative
IgG anti-HBc: Positive
Anti-HBs: Negative
Anti-HBe: Negative
Which of the following terms best describes his disease status?

A. Acute infection, early phase
B. Acute infection, recovery phase
C. Chronic infection, replicating virus
D. Chronic infection, nonreplicating virus
E. Previous exposure with immunity

ANSWER: C

The hepatitis B surface antigen, or HBsAg, is thefirst marker to appear after acute infection and, if the body is able to clear the virus, it disappears as the hepatitis B surface antibody (HepBsAb) appears. The presence of HBsAg after 6 months is indicative of chronic infection. HBeAg is a form of HBsAg and its presence indicates viral replication and infectivity. IgM antibodies are immediate-response antibodies indicating acute infection while the presence of IgG antibodies indicates a more chronic infection or immunity. This patient has + HBsAg and only IgG antibodies, indicating chronic infection. The presence of HBeAg is consistent with replication.

You check serologies on a patient exposed to hepatitis B. His serologies are as shown :
HBsAg: Negative
HBeAg: Negative
IgM anti-HBc: Negative
IgG anti-HBc: Negative
Anti-HBs: Positive
Anti-HBe: Negative
Which of the following terms best describes his disease status?

A. Acute infection, early phase
B. Acute infection, window phase
C. Acute infection, recovery phase
D. Previous exposure with immunity
E. Vaccination

ANSWER: E

The positivity of the anti-HBs indicates either exposure with immunity, recovery phase, or vaccination. If the patient had exposure and subsequent acute hepatitis, the IgM antibodies could be positive, but the longer-termIgG antibodies would not be present. Because the IgG anti-HBc is negative, there is no evidence of past exposure or infection.

You are following a patient after an acute hepatitis B infection. His serologies are as shown :
HBsAg: Positive
HBeAg: Positive
IgM anti-HBc: Positive
IgG anti-HBc: Negative
Anti-HBs: Negative
Anti-HBe: Negative
Which of the following terms best describes his disease status?

A. Acute infection, early phase
B. Acute infection, recovery phase
C. Chronic infection, replicating virus
D. Chronic infection, nonreplicating virus
E. Previous exposure with immunity

ANSWER: A

The HBsAg positivity in this case indicates either chronic infection or early infection. The presence of HBeAg is consistent with replication. The positivity of the IgM anti-HBc indicates early infection, and is negative in chronic infection. Additionally, if the patient were in the recovery phase, his HBsAg would be negative.

You are evaluating a 5-year-old girl whose mother brought her in to evaluate jaundice. Laboratory evaluation reveals a conjugated hyperbilirubinemia. Which of the following is the most likely cause of her problem?

A. G6PD deficiency
B. Gilbert disease
C. Crigler-Najjar syndrome
D. Wilson disease
E. Viral hepatitis

ANSWER: E

In evaluating childhood jaundice, it’s important to differentiate between conjugated and unconjugated hyperbilirubinemia. If jaundice occurs in childhood and is associated with unconjugated hyperbilirubinemia, hemolytic diseases (G6PD deficiency and spherocytosis), Gilbert disease, and Crigler-Najjar syndrome should be considered. If associated with conjugated hyperbilirubinemia, viral hepatitis is the most common cause. Less common causes of conjugated hyperbilirubinemia include Wilson disease and milder forms of galactosemia.

KFMC Mid-year 2022

A Hepatitis serology interpretation: Anti-HBc IgG +ve Anti-HBc IgM -ve HBsAg -ve Anti-HBs +v

A. Chronically infecte
B. Immune due to vaccin
C. Immune due to infection
D. Acute infection

ANSWER: C

KFMC Mid-year 2021

A 35-year-old male has a negative past medical history and a normal physical examination. He reports that he smokes half a pack of cigarettes per day. A comprehensive metabolic panel reveals an ALT (SGPT) of 30 U/L (N 10–40) and an AST (SGOT) of 84 U/L (N 10–30). The remaining laboratory studies are negative. There is no family history of liver disease. The laboratory findings suggest which one of the following?

A. Alcoholic liver disease
B. Hepatitis C

C. Nonalcoholic liver disease
D. Gilbert syndrome

ANSWER: A

An AST (SGOT) to ALT (SGPT) ratio greater than 2:1 suggests alcoholic liver disease, and a ratio of 3:1 or higher is highly suggestive of alcoholic liver disease. With most hepatocellular disorders, including nonalcoholic fatty liver disease, viral hepatitis, and iron overload disorder, the patient will have an AST to ALT ratio <1.

A 40 years old female presented with the following liver function test ALT high, AST high, ALP high… And has mild abdominal pain. What is your management?

A. Repeat LFT
B. US of liver
C. Screen for viral hepatitis

ANSWER: B

Most patients with symptomatic gallstones present with chronic cholecystitis, which causes recurrent attacks of pain. The pain is constant, increases in severity at the beginning, and lasts from 1 to 5 hours. It often starts during the night after a fatty meal and may be associated with nausea and vomiting. Abdominal ultrasonography is the initial imaging method. Laboratory findings include an elevated WBC count and elevated bilirubin, transaminases, and alkaline phosphatase.

KFMC Mid-year 2020

A 40-year-oldfemale new employee. She received hepatitis B vaccine 2 years ago. what do you expect to see in her serology test?

A. HBsAg negative, core negative, anti-body positive
B. HBsAg negative, core positive, anti-body positive
C. HBsAg positive, core negative, anti-body positive
D. HBsAg positive, core positive, anti-body positive

ANSWER: A

What type of hepatitis has fecal oral rote of transmission?

A. Hepatitis A
B. Hepatitis B
C. Hepatitis C
D. Hepatitis D

ANSWER : A

KFMC Mid-year 2019

Which one of the following does this pattern of hepatitis B virus serology suggest: HBsAg negative, anti-HBs positive, anti-HBc positive?

A. Acute hepatitis B infection
B. Resolved hepatitis B infection
C. Successful hepatitis B vaccination
D. Patient is susceptible to hepatitis B infection

ANSWER : B

Part 2022

Patient chronic carrier of hepatitis B, asymptomatic. Ultrasound reveals multiple gallstone. what is the most appropriate management?

A. reassurance and follow up
B. prophylactic cholecystectomy
C. dietary modification
D. Start him on statin

ANSWER: A
Chronic asx Hep B is NOT one of the indications to do cholecystectomy in ASYMPTOMATIC persons with gallbladder stones (choleLITHIASIS)
❌ other choices have no evidence in treating choleLITHIASIS!

Part 2021

A 60 year old patient came for hepatitis check- up after her husband was diagnosed with hepatitis B Serology:
HBV DNA +ve
HBe Ag - ve
HBc IgM +ve
HBsAb -ve
HBsAg -ve
What is the Diagnosis:

A. Acute hepatitis B, window period
B. Acute hepatitis B, active viral replication
C. Chronic hepatitis B, ..
D. Chronic hepatitis B, ..

ANSWER: A

Part 2020

Healthy man want to travel to Egypt. Which vaccine is recommended?

A. Hepatitis A
B. Pneumococcal
C. Meningococcal
D. Cholera

ANSWER: A
Source: Egypt Traveler View. CDC

Female come to your clinic and told for you her husband has hepatitis B and she want to check if she has infected or no, what to do to check the acute HBV infection?

A. HbsAg
B. HbcAb
C. HbsAb
D. HbeAg

ANSWER:?
Acute hepatitis B is characterized by the presence of anti-HBc IgM (WHO). HBeAgis generally considered to be a marker of HBV replication and infectivity. UpToDate (in either acute or chronic phase)

Part 2016

A 2-year-old participant in a day-care center is diagnosed with hepatitis A. As the physician consultant to the day-care center, you develop a fact sheet for other families, explaining to them that

A. Hepatitis A has a long incubation period (50 to 80 days)
B. Hepatitis A presents after a prolonged viremic stage
C. The presentation of hepatitis A is characterized by the sudden onset of fever, nausea, and vomiting
D. Hepatitis A is spread by parenteral route
E. An infection with hepatitis A results in elevations of liver function studies and serum bilirubin levels for 6 months or more

ANSWER: C
(Pediatric Pretest 10th edit q 366)UpToDate:IP of HAV is 15-50 days with average of 28 days (A is wrong)Transmitted by fecal-oral (D is wrong)HAV does not cause chronic hepatitis and fulminant hepatic failure occurs in <1% (E is wrong)

Part (OLD)

A 21 years old know case of type 1 Diabetes, presented withthis lab finding:
HBsAg +ve
HbsAb -ve
HBc IgM -ve
Hbe Ag -ve
Hbe Ab +ve
Anti c AB +ve
What is most likely interpreting?

A. Chronic infection

B. Acute infection
C. Post infection
D. Immunized

ANSWER: A
Patients with inactive chronic hepatitis B areHBeAg negative. This stage has also been referred to as the no replicativeor carrier phase. (UpToDate)

A premarital examination showed hepatitis B positive test. The patient asks about activity. How can you assess?

A. HBs Ag
B. HBe Ag
C. HBc Ab
D. HBs Ab

ANSWER: B
Medscape: Hepatitis B surface antigen (HBsAg) is the hallmark of HBV infection and is the first serological marker to appear in acute hepatitis B, and persistence of HbsAg for more than 6 months suggests chronic HBV infection. Hepatitis B e antigen (HbeAg) usually indicates active HBV replication and risk of transmission of infection.

The most common cause of HCC in KSA is:

A. Leishmaniasis
B. Fatty liver disease
C. Schistosomiasis
D. Hepatitis B

ANSWER: D
In general, cirrhosis of any etiology is the major risk factor for HCC. About 80% of patients with newly diagnosed HCC have preexisting cirrhosis. (Medscape)Worldwide, nearly 80% of HCC is associated with HBV and HCV infections.5,8HBV as an underlying cause for HCC development is more common in areas where HBV is endemic, like parts of Africa and Asia,7,9,10while in the United States, Europe and the Middle East, HCV is the commonest underlying etiology.11–14HCV infection was the the dominant risk factor for HCC in in our study, being nearly twice (1.8:1) as common as HBV infection, which is consistent with previously published studies from Saudi Arabia. (Annals of Saudi Medicine 2018)RefMost European and American countries show a preponderance of HCV over HBV and a substantial fraction of viral marker–negative cases. Asian and African countries generally show a predominance of HBV. (AASLD 2015).So, globally most common cause of HCC is HBV. (UpToDate)In Saudi Arabia most common cause is HCV.In non-cirrhotic HCC, most common cause is HBV

A surgeon who got needle stick injury from a hepatitis C patient. After 3 months he tested +ve with HCV Ab. What is the Percentage to have chronic HCV?

A. 10 %
B. 30 %
C. 75 %
D. 95 %

ANSWER: C

HCV: The infection progresses to a chronic state in 80% of patients. (AAFP)HBV: approximately 90% for a perinatally acquired infection. Less than 5% for an adult-acquired infection. (UpToDate)

A doctor had injured himself with contaminated needle after a surgical procedure. The patient is not known for blood borne diseases. The doctor is vaccinated for Hep B before. What to do next?

A. Start antiviral medications
B. Test the doctor and the patients for bloodborne diseases
C. Reassurance because he is vaccinated against Hep b
D. Check immunology (Ab) after 6 weeks

ANSWER: B

Needle-stick Guideline Workup Laboratory studies in the source patient(if available) are as follows:•HIV testing•Hepatitis B antigen•Hepatitis C antibody•Aspartate aminotransferase/alanine aminotransferase (AST/ALT) and alkaline phosphatase levelsLaboratory studies in exposed individuals/health care workerinclude the following:•Hepatitis B surface antibody•HIV testing at time of incident and again at 6 weeks, 3 months,and 6 months•Hepatitis C antibody at time of incident and again at 2 weeks, 4 weeks, and 8 weeks (Medscape)

A chronic hepatitis B patient has no abdominal pain. On a follow-up with US accidentally discovered to have a multiple gallstone. He has no fever, no jaundice. What would you do for him?

A. Reassurance and follow up
B. Prophylactic cholecystectomy
C. Diet modification
D. Start him on statins

ANSWER: A

Prophylactic cholecystectomy may be beneficial for patients who are at high risk of biliary cancer, infection, or other complications, including younger patients and those with choledocholithiasis(bile duct stone), sickle cell disease, gallstones larger than 3 cm, or significant immunosuppression. (AAFP)So, chronic liver disease in not an indication of prophylactic cholecystectomy.For asymptomatic gallstones, no medical therapy aside from pain control is recommended. (AAFP)

A nurse calls you after she stuck her needle while she was taking a blood sample from an end stage liver disease with hepatitis C. What would you say to her?

A. Take interfere and ribavirin and follow up antibodies in 6 months
B. Take acyclovir and follow up antibodies six month
C. Pooled immunoglobin and follow up here antibodies
D. Follow up here antibodies six month.

ANSWER: D

If the source patient is known to be positive for HCV antibody and/or HCV RNA, the follow-upschedule for the exposed worker should be as follows Week 4: HCV RNA and liver panel Week 12: HCV RNA and liver panel Week 24: Liver panel and HCV antibody. Neither immunoglobulin nor antiviral agents are recommended for HCV post-exposure prophylaxis.

A 27-year-old IV drug abuser found to have high liver enzymes. He came to check his hepatitis profile.The results showed: HBsAg +ve, HBsAB: -ve , HBcAB: +ve , HBeAg: -ve , HBeAB : +ve. What is your diagnosis?

A. Carrier with low infectivity
B. Chronic hepatitis B infection with high infectivity
C. Patient is immune
D. Acute hepatitis B infection

ANSWER: A

(HBsAg is +ve with low infectivity HBeAg is –ve)Chronic hepatitis B infection with high infectivity when HBsAg is +ve and HBeAg is +ve.Patient is immune: HBsAb is +ve. Acute hepatitis B infection: when HBsAg,HBeAg, HBcAg are +ve

A 12 years old with chronic hepatitis C infection. What to give?

A. Active vaccination
B. Interferon
C. Zidovudine

ANSWER: ?

WHO treatment recommendation of HCV:1.WHO recommends offering treatment to all individuals diagnosed with HCV infection who are 12 years of age or older, irrespective of disease stage.2.WHO recommends the use of pan-genotypic DAA regimens for the treatment of persons with chronic HCV infection aged 18 years and above.3.In adolescents aged 12-17 years or weighing at least 36 kg with chronic HCV infection,WHO recommends:•Sofosbuvir/ledipasvir for 12 weeks in genotypes 1, 4, 5 and 6•Sofosbuvir/ribavirin for 12 weeks in genotype 2•Sofosbuvir/ribavirin for 24 weeks in genotype 3.4.In children aged less than 12 years with chronic hcv infection, who recommends:•Deferring treatment until 12 years of age•Treatment with interferon-based regimens should no longer be used.

A patient will travel to china after one month and stay for one year. Came for vaccination. He has not received hep A or B vaccine before. What vaccine to give?

A. Two dose of hepatitis A one month apart
B. Immunoglobulin
C. Hepatitis A vaccine and immunoglobulin
D. Hepatitis A

ANSWER: D

AAFP: For optimal protection, vaccination with a single-dose hepatitis A vaccine should be undertaken as soon as travel is anticipated. Protection is probably presentat least by two weeks after the first injection, and completion of the series is recommended for long-term protection.If the patient is 40 years or older, is immunocompromised, has chronic liver disease, or plans on departing in less than two weeks, then simultaneous administration of immunoglobulin (0.02 mL per kg) with the vaccinemay be considered. If an individual does not want the vaccine, is younger than 12 months, or for some other reason cannot take the vaccine, then a single dose of immunoglobulin. Pre-exposure prophylaxis 2-dose schedule 0 , 6 month

A Patient with hepatitis C presented to ER with hematemesis. The cause is:

A. Esophageal varieces

ANSWER: No Choices

Symptoms of decompensated liver disease are related to synthetic dysfunction and portal hypertension, such as the following: Mental status changes (hepatic encephalopathy) Ankle edema and abdominal distention (ascites) Hematemesis or melena (variceal bleeding). (Medscape)

Which one of the following does this pattern of hepatitis B virus serology suggest: HBsAg negative, anti-HBs positive, anti-HBc positive?

A. Acute hepatitis B infection
B. Resolved hepatitis B infection
C. Successful hepatitis B vaccination
D. Patient is susceptible to hepatitis B infection

ANSWER: B

A 40-year-old school teacher develops nausea and vomiting at the beginning of the fall semester. Over the summer she had taught preschool children in a small town in Mexico. She is sexually active but has not used intravenous drugs and has not received blood products. Physical examination reveals scleral icterus, right upper quadrant tenderness, and a palpable liver. Liver function tests show aspartate aminotransferase of 750 U/L (normal < 40) and alanine aminotransferase of 1020 U/L (normal < 45). The bilirubin is 13 mg/dL (normal < 1.4) and the alkaline phosphatase is normal. What further diagnostic test is most likely to be helpful?

A. Liver biopsy
B. Abdominal ultrasound
C. IgM antibody to hepatitis A
D. Antibody to hepatitis B surface antigen

ANSWER:C

A 2 years old boy brought by his mother because of lethargic and irritability. On examination he is lethargic, jaundiced with right upper quadrant pain and miosis. She reports also vomiting before 2 days. She think she may took few tablets before 3 days. What is the most likely drug he took:

A. Paracetamol.
B. Amphetamine.
C. Morphine.
D. Clonidine.
E. Ranitidine.

ANSWER: A

Acetaminophen toxicity: Anorexia; elevated liver enzymes; jaundice; lethargy; liver failure; nausea and vomiting; pallor. AAFPAcetaminophen toxicity is divided into four stages:First stage: (30 min to 24 hours), the patient may be asymptomatic or may have emesis.Second stage (18 hours to 72 hours), there may be emesis plus right upper quadrant pain and hypotension.Third stage(72 hours to 96 hours), liver dysfunction is significant with renal failure, coagulopathies, metabolic acidosis, and encephalopathy. Gastrointestinal (GI) symptoms reappear, and death is most common at this stage.Fourth stage(4 days to 3 weeks) is marked by recovery.

A child with history Of 5 days using ASA presented with enlarged liver and increase AST,ALT, Bilirubin, diagnosis is?

A. Reye's syndrome
B. Drug induce hepatitis.
C. Infectious hepatitis.

ANSWER: A

Medscape: Reye syndrome is characterized by acute noninflammatory encephalopathy and fatty degenerative liver failure. Reye syndrome typically occurs after a viral illness, particularly an upper respiratory tractinfection, influenza, varicella, or gastroenteritis, and is associatedwith the use of aspirin during the illness. Reye's syndrome is a rare condition that causes serious liver and brain damage. The exact cause of Reye's syndrome is unknown, but most cases have been in children recovering from a viral infection, such as influenza (flu) or chickenpox, and in many of these cases the child had previously taken aspirin to treattheir symptoms.

A patient with uncontrolled DM using herbs. His last labs show elevated HbA1C, elevated creatinine and liver enzymes. What is the most appropriate action?

A. Take history about the herbs
B. There is clinical evidence for herbs
C. Disregard the herbs
D. Discuss with the herbalist who prescribed these herbs

ANSWER: A

Promotion

Which one of the following has the highest risk of hepatitis C virus transmission?

A. Drug user
B. Homosexual
C. Health care worker
D. Alcoholics

ANSWER: A

UpToDate: Injection drug use with shared needles or other paraphernalia has been the most common identifiable source of acute HCV infection

A 57 years old known to have DM came for routine visit. What vaccines to give?

A. Hepatitis B, pneumococcal, influenza

B. Hepatitis B, meningococcal, H.influenza
C. Hepatitis B, hepatitis A, tetanus toxoid

ANSWER: A

A nurse is working in the dialysis department at the hospital and stings the needle in her hand. She just received her hepatitis immunization last year. The patient known of HBsAG positive status. what to do next?

A. Reassurance
B. Check the nurse hepatitis B virus antibody
C. Give her hepatitis B vaccination
D. HB immunoglobulin only

ANSWER: B
(UpToDate)

A student completed his hepatitis B vaccination series 3 months ago. What will you see in his serology?

A. Hepatitis b surface antibody
B. Hepatitis b surface antigen
C. Hepatitis b core antibody
D. Both hepatitis b core and surface anti body

ANSWER: A

A young patient with a history of fever jaundice and flu like symptoms since 1-2 week. On exam patient is jaundiced. Labs: high bilirubin, high ALT and AST. What is the most likely diagnosis is?

A. Gilbert syndrome
B. Hepatitis A
C. Cholelithiasis

ANSWER: B

A pregnant lady with positive hepatitis surface antigen?

A. Give the infant only hep B Immunoglobulin in the first 12 hours.
B. It's safe to breastfeed.
C. It’s not safe to breastfeed
D. Give vaccine only at birth

ANSWER: B
Women with HBV infection should be counseled that breastfeeding does not increase the likelihood of infection in their children. Newborns of HBsAg-positive mothers should receive hepatitis B immune globulin and hepatitis Bvaccine

within 12 hours of birth.

A postpartum female delivered her newborn child. The mother did not follow in antenatal clinic. She had hep B infection in previous pregnancy. What is the most appropriate next step?

A. Test the child with Hep B S antigen
B. Give the child immunoglobulin and hep B vaccine
C. Test the mother for Hep B S antigen

ANSWER: B

A 4 months old baby attended your clinic with his mother. Which group of the following vaccines should be given at this age?

A. HBV,Diphtheria , tetanus.
B. HAV, HBV,DPT
C. HBV, MMR , OPV
D. HAV, Varicella , PCV

ANSWER: A

Female present to ER with history of ingestion of 40-50 tablets of paracetamol before 30 hours. what is the best measure that help you in prognosis?

A. Creatinine
B. Bilirubin
C. Paracetamol
D. AST

ANSWER: A

You recently ordered labratory tests for a man who does not have housing who you are caring for at the local community clinic. The results came back positive for an acute hepatitis B infection which of the following is the best next step in the management of the patients condition ?

A. Hepatitis B vaccine
B. Interferon alfa
C. Oral antiviral agents
D. Supportive care

ANSWER: D

PSMMC

A 22-year-old male presented for evaluation of painless jaundice. He initially was seen with a flu-like illness with high fevers, where mild scleral icterus was noted. Initial laboratory studies revealed a normal complete blood count, normal alkaline phosphatase level, and normal alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels as well as a total serum bilirubin of 4 mg/dL and direct serum bilirubin of 0.4 mg/dL. Serologic testing for hepatitis was negative. At this visit, the flu-like illness has spontaneously resolved, and repeated laboratory testing reveals that total serum bilirubin has returned back to normal. He has not taken any medications for his illness. What is the most likely cause of this patient's elevated serum bilirubin level?

A. Acute viral hepatitis
B. Gilbert's syndrome
C. Primary biliary cirrhosis (PBC)
D. Primary sclerosing cholangitis (PSC)

ANSWER: B

Which of the following statements is true regarding the hepatitis C antibody?

A. Hepatitis C antibodies can be injected in the form of a vaccine.
B. The hepatitis C virus does not cause the body to produce antibodies.
C. Its presence in the blood cannot distinguish between active or previous infection; other tests may be required.
D. If hepatitis C antibodies are present in the blood, this indicates there is an active infection

ANSWER: C

A 33 years old male is following up in primary health care center for reviewing the results of his hepatitis panel. The results are:
HBsAb: positive.
HBsAg: negative.
What do these results indicate?

A. A past hepatitis B infection.
B. Evidence of receiving the hepatitis B vaccine.
C. An active hepatitis B infection
D. More tests are needed for a diagnosis

ANSWER: D

A 40-year-old woman is evaluated at a follow up appointment for hepatitis B virus (HBV) infection which was diagnosed at age 23 years. The patient also has psoriasis. She is married. Medications are topical clobetasol and an oral contraceptive agent.

On physical examination vital signs are normal. Psoriatic lesions are present on the elbow and knees. No hepatosplenomegaly is noted.

Laboratory studies:

Alkaline phosphatase	125 U/L
Alanine aminotransferase	112 U/L
Hepatitis B surface antigen	positive

Hepatitis Be antigen	positive
HBV DNA	41.326 IU/mL

Which of the following is the most appropriate treatment?

A. No treatment
B. Tenofovir
C. Pegylated interferon
D. Lamivudine

ANSWER: A

A 29-year-old woman is diagnosed with hepatitis B virus (HBV) infection 10 years ago, her mother had HBV infection, and it was presumed that the patient acquired the infection at birth. She reports feeling well. Her medical history is otherwise unremarkable and she takes no medication. On physical examination, vital signs are normal, as is the remainder of the examination. Laboratory studies are positive for hepatitis B surface antigen and positive for hepatitis B antigen. The serum HBV DNA level is 20,000,000 IU/mL. ALT and AST levels are within normal limits. Which of the following is the most appropriate next step in management?

A. Entecavir
B. Hepatic ultrasonography
C. Pegylated interferon
D. Repeat liver chemistry test in 6 months

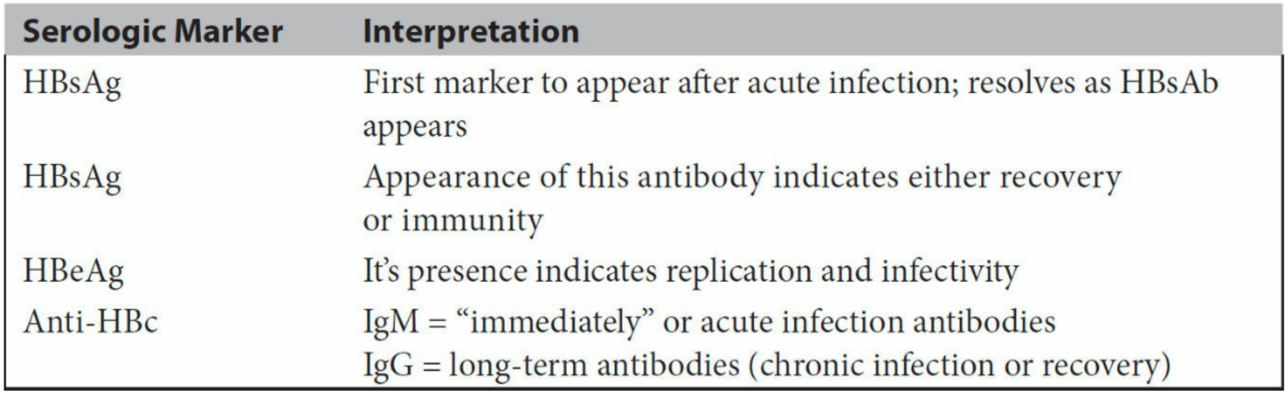
ANSWER: D

Dr. Ahmed Andijani's quiz

You are following a patient after an acute hepatitis B infection. His serology. Are shown below:
HBsAg: Positive
HBeAg : Positive
IgM anti-HBc: Negative
IgG anti- HBc: Positive
Anti-HBe: Negative
Which of the following term best describes his disease statue?

A. Acute infection, early phase
B. Acute infection, recovery phase
C. Chronic infection, replicating phase
D. Chronic infection, nonreplicating pahse
E. Previous exposure with immunity

ANSWER: C
The hepatitis B surface antigen, or HBsAG, is the first marker to appear after acute infection and, if the body is able to clear the virus, it disappears as the hepatitis B surface antibody (HepBsAb) appears. The presence of HBsAg after 6 months is indicative of chronic infection. HBeAg is a form of HBsAg and its presence indicates viral replication and infectivity. IgM antibodies are immediate-response antibodies indicating acute infection while the presence of IgG antibodies indicates a more chronic infection or immunity. This patient has + HBsAg and only IgG antibodies, indicating chronic infection. The presence of HBeAg is consistent with replication.
PreTest fourth edition. Q197



Serologic Marker	Interpretation
HBsAg	First marker to appear after acute infection; resolves as HBsAb appears
HBsAg	Appearance of this antibody indicates either recovery or immunity
HBeAg	It's presence indicates replication and infectivity
Anti-HBc	IgM = "immediately" or acute infection antibodies IgG = long-term antibodies (chronic infection or recovery)

You check serologies on a patient exposed to hepatitis B. His serologies are shown below:
HBsAg: Negative HBeAg: Negative
IgM anti-HBc: Negative
IgG anti-HBc: Negative
Anti-HBs: Positive
Anti-HBe: Negative
Which of the following terms best describes his disease status?

A. Acute infection, early phase
B. Acute infection, window phase
C. Acute infection, recovery phase
D. Previous exposure with immunity
E. Vaccination

ANSWER: E
Description: The positivity of the anti-HBs indicates either exposure with immunity, recovery phase, or vaccination. If the patient had exposure and subsequent acute hepatitis, the IgM antibodies could be positive, but the longer term IgG antibodies would not be present. Because the IgG anti-HBc is negative, there is no evidence of past exposure or infection.
PreTest fourth edition. Q198

You are following a patient after an acute hepatitis B infection. His serologies are shown below:
HBsAg: Positive
HBeAg: Positive
IgM anti-HBc: Positive
IgG anti-HBc: Negative
Anti-HBs: Negative
Anti-HBe: Negative
Which of the following terms best describes his disease status?

A. Acute infection, early phase
B. Acute infection, recovery phase
C. Chronic infection, replicating virus
D. Chronic infection, nonreplicating virus
E. Previous exposure with immunity

ANSWER: A

The HBsAg positivity in this case indicates either chronic infection or early infection. The presence of HBeAg is consistent with replication. The positivity of the IgM anti-HBc indicates early infection, and is negative in chronic infection. Additionally, if the patient were in the recovery phase, his HBsAg would be negative.
PreTest fourth edition. Q199

A 52-year-old male sees you for the first time for a health maintenance visit. He previously tested positive on a hepatitis C antibody test performed by another physician. He seeks your opinion regarding follow-up testing. Which one of the following tests would you suggest at this point?

A. Fetoprotein
B. Hepatitis B antigen
C. Hepatitis C RNA
D. Ultrasonography of the liver
E. A liver biopsy

ANSWER: C

Screening for hepatitis C virus (HCV) with an anti-HCV antibody test is recommended for all adults at high risk of infection, and one-time screening is recommended in adults born between 1945 and 1965. If the anti-HCV antibody test result is positive, current infection should be confirmed with a qualitative HCV RNA test.
American Board of Family Medicine 2017 Q72

A 45-year-old woman was diagnosed 6 months ago with acute hepatitis B infection. She is unaware of how she contracted the virus. She takes no medications and since the diagnosis, she has started taking a multivitamin and has started exercising. She now has the following serologies. HBsAg negative; anti-HBsAg positive; HBeAg negative; anti-HiBcAg positive. Which of the following is the correct diagnosis?

A. Chronic active infection with low infectivity
B. Chronic active infection with high infectivity
C. Resolved acute infection
D. Resolved acute infection but contagious to sexual contacts
E. Resolved infection but at risk for reinfection in the future

ANSWER: C

These serologies are consistent with resolved hepatitis B infection and ongoing immunity; the HBsAg antibodies indicate immunity. This patient has both negative surface and e antigens, so is not at risk to spread the disease to others.
CASE FILES fourth edition P508

A 60-year-old retired Navy captain comes to the doctor after a 15-b unintentional weight gain over the past 4 months. His medical history is significant for osteoarthritis and his only complaint is fatigue. He has smoked a pack of cigarettes daily since his early 20s and consumes two to three alcoholic bever. ages several times per week. On examination, he is slightly jaundiced, with no hepatomegaly or RUQ tenderness to palpation. He has mild shifting dullness in his abdomen, and significant lower extremity edema. His skin is noted to have several faded tattoos. Which of the following antibodies would most likely be present in this patient?

A. Anti-HAV IgG
B. Anti-HBc IgM
C. Anti-HBs IgG
D. Anti-HBe IgM
E. Anti-HCV IgG

ANSWER E
The patient has chronic hepatitis C that has progressed to cirrhosis causing the edema, weight gain, and ascites. Hepatitis A does not proceed to cirrhosis. Anti-HBs is present in people immunized to hepatitis B. Anti-HBe IgM reflects viral infectivity of hepatitis B. Anti-HBc IgM reflects exposure to hepatitis B 4 to 36 weeks after exposure.
CASE FILES fourth edition P509

Which of the following tests is used to detect hepatitis B infection during the “window period”?

A. Hepatitis B surface antigen
B. Hepatitis B surface antibody
C. Hepatitis B core antibody (IgM)
D. Hepatitis B e antigen
E. Hepatitis B antibody to the delta agent

ANSWER: C
Hepatitis B core antibody IgM and IgG. Anti-hepatitis B core antibody IgM is useful when trying to determine infection with the virus during the “window period” (i.e., the time between the disappearance of the surface antigen and the development of the antibody). Its presence indicates a current infection with hepatitis B. Anti-hepatitis B core antibody IgG indicates a previous hepatitis B infection, and its presence remains indefinitely.
Bratton's Q330

Childhood mental and behavioral disorders

Collected by: Shaima Alduaiji R3
Reviewed by: Salem Alshahrani R1

Attention deficit hyperactivity disorder (ADHD):

Definition: a persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning, development, academic or social life.

Etiology: is not fully understood, but there is a complex interaction of genetic, environmental, neurochemical, and psychosocial factors.
ADHD includes three subtypes: primarily inattentive, primarily hyperactive-impulsive, combined.

Hyperactive and impulsive behaviors	inattentive
inability to sit still or inhibit behavior.	reduced ability to focus
Typically observed in children aged 4 years, increase during the next three to four years, peak at seven to eight years of age.	typically, are not apparent until the child is eight to nine years of age.
Symptoms of impulsivity in adolescents include substance use, and impaired driving behavior.	The typical presenting complaints usually center on academic problems, they appeared to be daydreaming.
Hyperactivities tend to decline when child reach adolescent while impulsive symptoms usually persist throughout life.	lifelong problem commonly results in academic difficulties in adolescent.

Diagnosis:

- For children <17 years, the DSM-5 diagnosis of ADHD requires ≥6 symptoms of hyperactivity and impulsivity or ≥6 symptoms of inattention.
- For adolescents ≥17 years and adults, ≥5 symptoms of hyperactivity and impulsivity or ≥5 symptoms of inattention are required.

The symptoms of hyperactivity/impulsivity or inattention must:
Occur often,Be present in more than one setting (eg, school and home), Persist for at least six months , May Be present before the age of 12 years, Impair function in academic or social activities and developmental level of the child.

There are many rating scales, used to assess the degree of functional impairment id psychiatric clinic but the most popular one is Weiss Functional Impairment Rating Scale.

Management:
in children younger or older than 6 years old is behavioral therapy, It include programs of child & parent training of different skills : stress mangment, problem solving.
families should be educated and provided with ADHD-specific resources.

Pharmacologic Therapy should start in children six years and older in severe cases according to the used rating scales: 14-16 symptoms

Stimulant medications are the first line of treatment for moderate to severe forms, followed by atomoxetine, and then alpha -2 agonists & tricyclic antidepressants (TCAs).

- Stimulants: Methylphenidate (most tolerable), Dexmethylphenidate, Amphetamine, Dextroamphetamine
- Nonstimulants: Snri: Atomoxetin, Viloxazine
- Alpha-2 adrenergic agonist: Guanfacine

Table 2. Diagnostic Criteria for Attention-Deficit/Hyperactivity Disorder

A. A persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development, as characterized by (1) and/or (2):

1. **Inattention:** Six (or more) of the following symptoms have persisted for at least six months to a degree that is inconsistent with developmental level and that negatively impacts directly on social and academic/occupational activities:

   Note: The symptoms are not solely a manifestation of oppositional behavior, defiance, hostility, or failure to understand tasks or instructions. For older adolescents and adults (age 17 and older), at least five symptoms are required.

   a. Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or during other activities (e.g., overlooks or misses details, work is inaccurate).
   b. Often has difficulty sustaining attention in tasks or play activities (e.g., has difficulty remaining focused during lectures, conversations, or lengthy reading).
   c. Often does not seem to listen when spoken to directly (e.g., mind seems elsewhere, even in the absence of any obvious distraction).
   d. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (e.g., starts tasks but quickly loses focus and is easily sidetracked).
   e. Often has difficulty organizing tasks and activities (e.g., difficulty managing sequential tasks; difficulty keeping materials and belongings in order; messy, disorganized work; has poor time management; fails to meet deadlines).
   f. Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (e.g., schoolwork or homework; for older adolescents and adults, preparing reports, completing forms, reviewing lengthy papers).
   g. Often loses things necessary for tasks or activities (e.g., school materials, pencils, books, tools, wallets, keys, paperwork, eyeglasses, mobile telephones).
   h. Is often easily distracted by extraneous stimuli (for older adolescents and adults, may include unrelated thoughts).
   i. Is often forgetful in daily activities (e.g., doing chores, running errands; for older adolescents and adults, returning calls, paying bills, keeping appointments).

2. **Hyperactivity and impulsivity:** Six (or more) of the following symptoms have persisted for at least six months to a degree that is inconsistent with developmental level and that negatively impacts directly on social and academic/occupational activities:

   Note: The symptoms are not solely a manifestation of oppositional behavior, defiance, hostility, or a failure to understand tasks or instructions. For older adolescents and adults (age 17 or older), at least five symptoms are required.

   a. Often fidgets with or taps hands or feet or squirms in seat.
   b. Often leaves seat in situations when remaining seated is expected (e.g., leaves his or her place in the classroom, in the office or other workplace, or in other situations that require remaining in place).
   c. Often runs about or climbs in situations where it is inappropriate. (**Note:** In adolescents or adults, may be limited to feeling restless.)
   d. Often unable to play or engage in leisure activities quietly.
   e. Is often "on the go," acting as if "driven by a motor" (e.g., is unable to be or uncomfortable being still for extended time, as in restaurants, meetings; may be experienced by others as being restless or difficult to keep up with).
   f. Often talks excessively.
   g. Often blurts out an answer before a question has been completed (e.g., completes people's sentences; cannot wait for turn in conversation).
   h. Often has difficulty waiting his or her turn (e.g., while waiting in line).
   i. Often interrupts or intrudes on others (e.g., butts into conversations, games, or activities; may start using other people's things without asking or receiving permission; for adolescents and adults, may intrude into or take over what others are doing).

B. Several inattentive or hyperactive-impulsive symptoms were present prior to age 12 years.

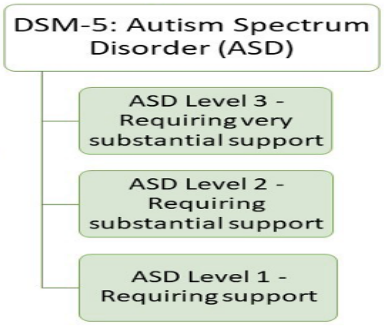
C. Several inattentive or hyperactive-impulsive symptoms are present in two or more settings (e.g., at home, school, or work; with friends or relatives; in other activities).

D. There is clear evidence that the symptoms interfere with, or reduce the quality of, social, academic, or occupational functioning.

E. The symptoms do not occur exclusively during the course of schizophrenia or another psychotic disorder and are not better explained by another mental disorder (e.g., mood disorder, anxiety disorder, dissociative disorder, personality disorder, substance intoxication or withdrawal).

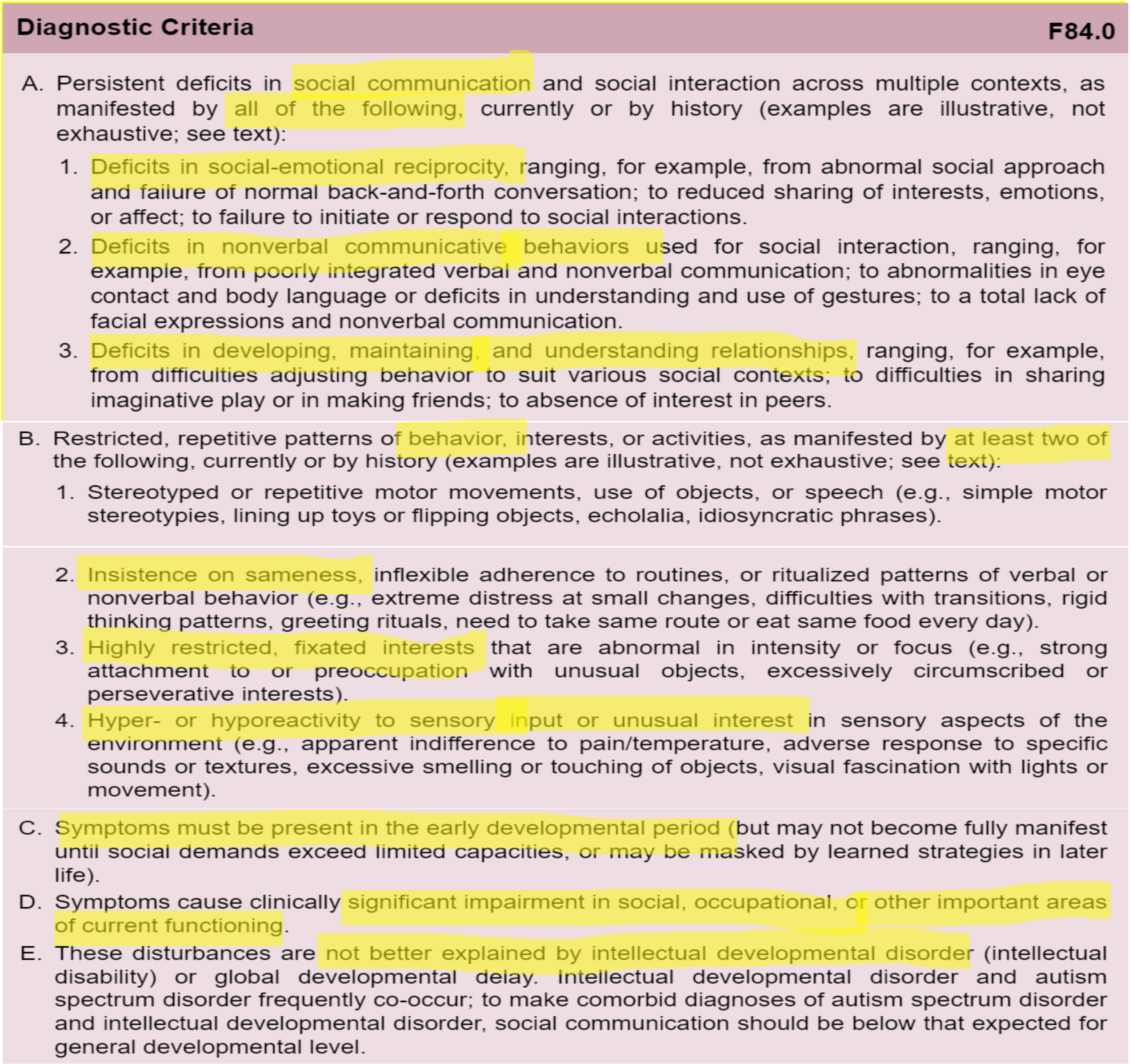
Reprinted with permission from American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. *5th ed. Arlington, Va.: American Psychiatric Association; 2013:59-60.*

Autism:


DSM-5: Autism Spectrum Disorder (ASD)
ASD Level 3 - Requiring very substantial support
ASD Level 2 - Requiring substantial support
ASD Level 1 - Requiring support

Definition: heterogeneous. neurodevelopmental disorder with a broad range of clinical manifestations of atypical social communication and social interaction, and restricted, repetitive patterns of behavior.

Etiology: is not fully understood, but there is a complex interaction of genetic, environmental, neurochemical, Maternal medication use (Valproate).



Diagnostic Criteria **F84.0**

A. Persistent deficits in social communication and social interaction across multiple contexts, as manifested by all of the following, currently or by history (examples are illustrative, not exhaustive; see text):
   1. Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions.
   2. Deficits in nonverbal communicative behaviors used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and nonverbal communication.
   3. Deficits in developing, maintaining, and understanding relationships, ranging, for example, from difficulties adjusting behavior to suit various social contexts; to difficulties in sharing imaginative play or in making friends; to absence of interest in peers.

B. Restricted, repetitive patterns of behavior, interests, or activities, as manifested by at least two of the following, currently or by history (examples are illustrative, not exhaustive; see text):
   1. Stereotyped or repetitive motor movements, use of objects, or speech (e.g., simple motor stereotypies, lining up toys or flipping objects, echolalia, idiosyncratic phrases).
   2. Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat same food every day).
   3. Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interests).
   4. Hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of the environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).

C. Symptoms must be present in the early developmental period (but may not become fully manifest until social demands exceed limited capacities, or may be masked by learned strategies in later life).

D. Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning.

E. These disturbances are not better explained by intellectual developmental disorder (intellectual disability) or global developmental delay. Intellectual developmental disorder and autism spectrum disorder frequently co-occur; to make comorbid diagnoses of autism spectrum disorder and intellectual developmental disorder, social communication should be below that expected for general developmental level.

Associated conditions:

- Developmental: Intellectual developmental disorder, Language disorder (i.e., an inability to comprehend and construct sentences with proper grammar), Specific learning difficulties (literacy or numeracy) are common, Developmental coordination disorder.
- Medical: Epilepsy, Constipation.
- mental disorders: Anxiety, depression, Avoidant/restrictive food intake disorder, extreme and narrow food preferences may persist.

Screening:

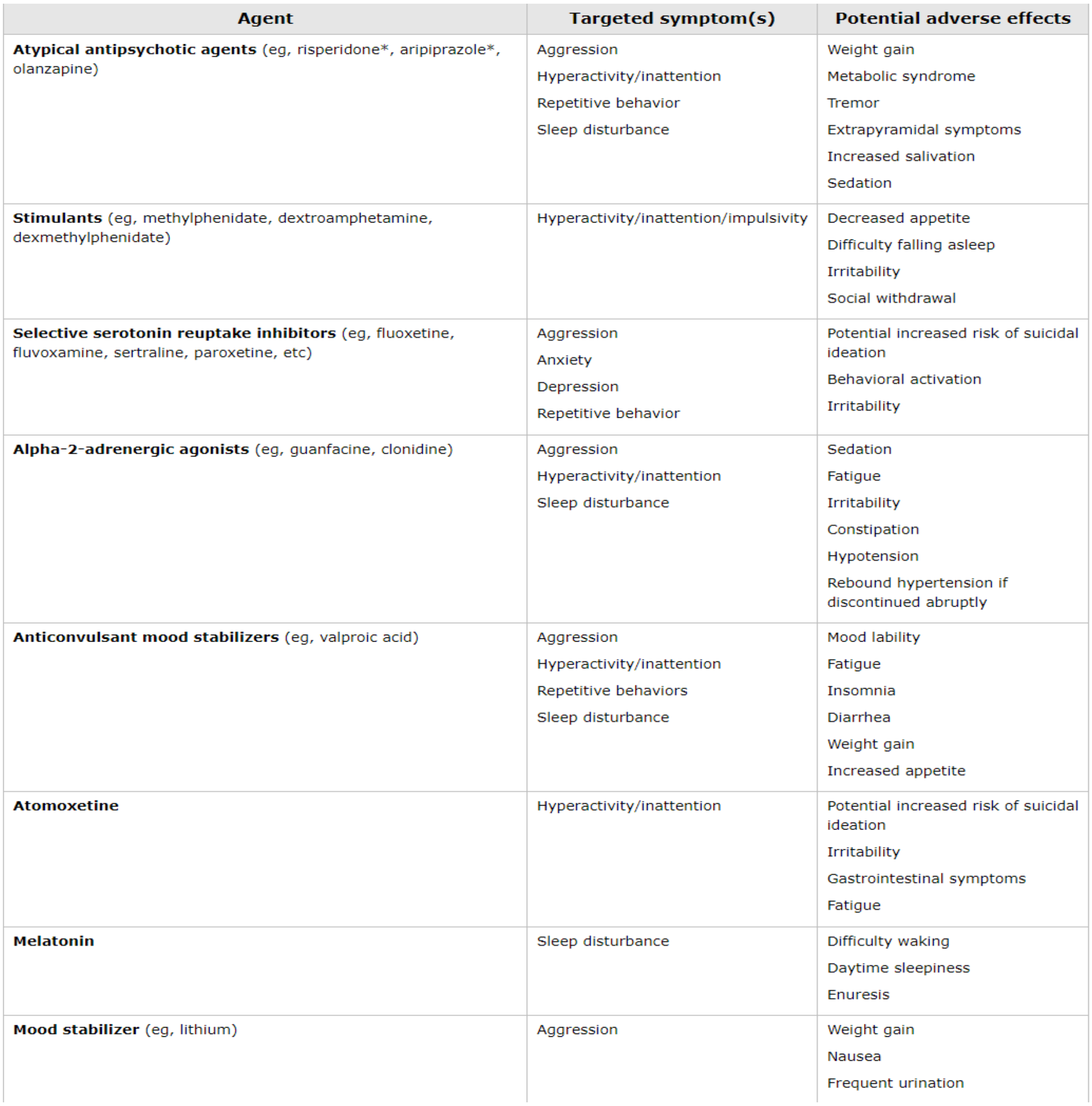
The AAP recommends all children screened at ages 18 and 24 months, along with regular developmental surveillance. Children should be referred for intervention for all identified developmental delays at the time of identification and not wait for an ASD diagnostic evaluation to take place, early management lead to better prognosis.
E.G for screening tool: M chat RF, STAT, RITA-T

Management:

Intensive behavioral interventions.
Communication interventions: including speech and language.
Social skills instruction.
Occupational Therapy.
Educational interventions.

Pharmacologic approach:

Psychopharmacologic agents do not treat autism itself and should be initiated only after educational and behavioral interventions are in place, comorbid psychiatric or medical illnesses ruled out, and psychosocial/environmental stressors considered



Agent	Targeted symptom(s)	Potential adverse effects
Atypical antipsychotic agents (eg, risperidone*, aripiprazole*, olanzapine)	Aggression Hyperactivity/inattention Repetitive behavior Sleep disturbance	Weight gain Metabolic syndrome Tremor Extrapyramidal symptoms Increased salivation Sedation
Stimulants (eg, methylphenidate, dextroamphetamine, dexmethylphenidate)	Hyperactivity/inattention/impulsivity	Decreased appetite Difficulty falling asleep Irritability Social withdrawal
Selective serotonin reuptake inhibitors (eg, fluoxetine, fluvoxamine, sertraline, paroxetine, etc)	Aggression Anxiety Depression Repetitive behavior	Potential increased risk of suicidal ideation Behavioral activation Irritability
Alpha-2-adrenergic agonists (eg, guanfacine, clonidine)	Aggression Hyperactivity/inattention Sleep disturbance	Sedation Fatigue Irritability Constipation Hypotension Rebound hypertension if discontinued abruptly
Anticonvulsant mood stabilizers (eg, valproic acid)	Aggression Hyperactivity/inattention Repetitive behaviors Sleep disturbance	Mood lability Fatigue Insomnia Diarrhea Weight gain Increased appetite
Atomoxetine	Hyperactivity/inattention	Potential increased risk of suicidal ideation Irritability Gastrointestinal symptoms Fatigue
Melatonin	Sleep disturbance	Difficulty waking Daytime sleepiness Enuresis
Mood stabilizer (eg, lithium)	Aggression	Weight gain Nausea Frequent urination

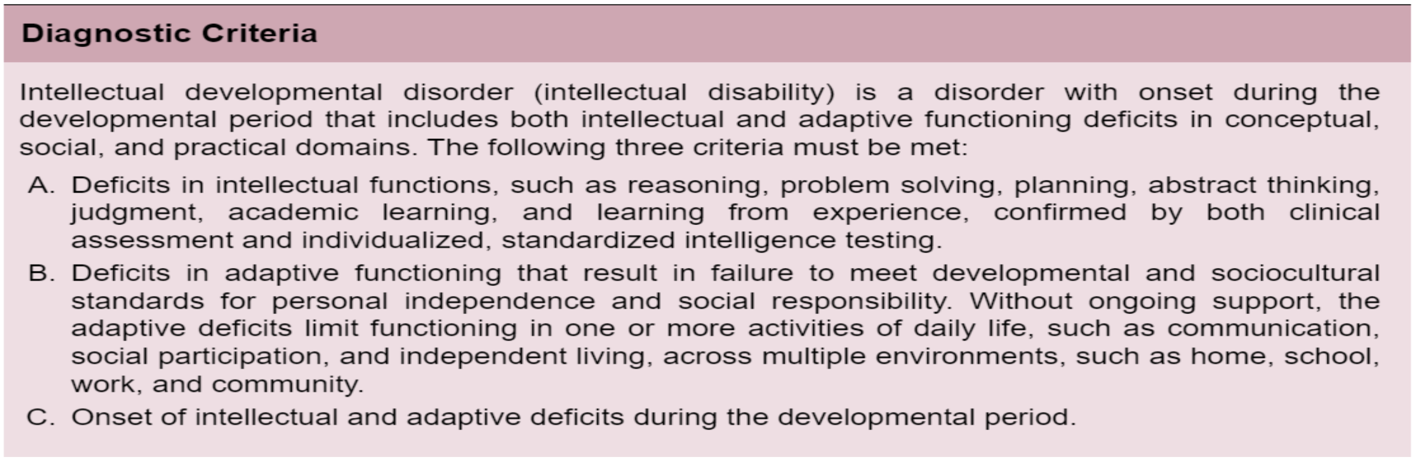
Intellectual disability:

Definition: neurodevelopmental disorder that begins in childhood and is characterized by limitations in both intelligence and adaptive skills, affecting at least one of three adaptive domains (conceptual, social, and practical), with varying severity.

Etiology: **Genetic**:

Chromosomal Abnormalities: Down syndrome: most known genetic cause of intellectual disability. DiGeorge syndrome (22q11 deletion syndrome). Williams syndrome (7q11.23 deletion syndrome). Smith-Magenis syndrome (17p11.2 deletion syndrome). Angelman syndrome (15q11-13 maternal deletion syndrome). Prader-Willi syndrome (15q11-13 paternal deletion syndrome). Other deletion and microdeletion syndromes.	Single Gene Mutations: Autosomal Dominant (ARID1B, ANKRD11, KMT2A and many others). Autosomal Recessive (PRSS12, TANGO2, CRBN and many others). X-linked Disorders Fragile X syndrome: Most common X-linked single gene disorder causing ID. MECP2-related disorders: e.g. Rett syndrome. Mitochondrial Disorders.

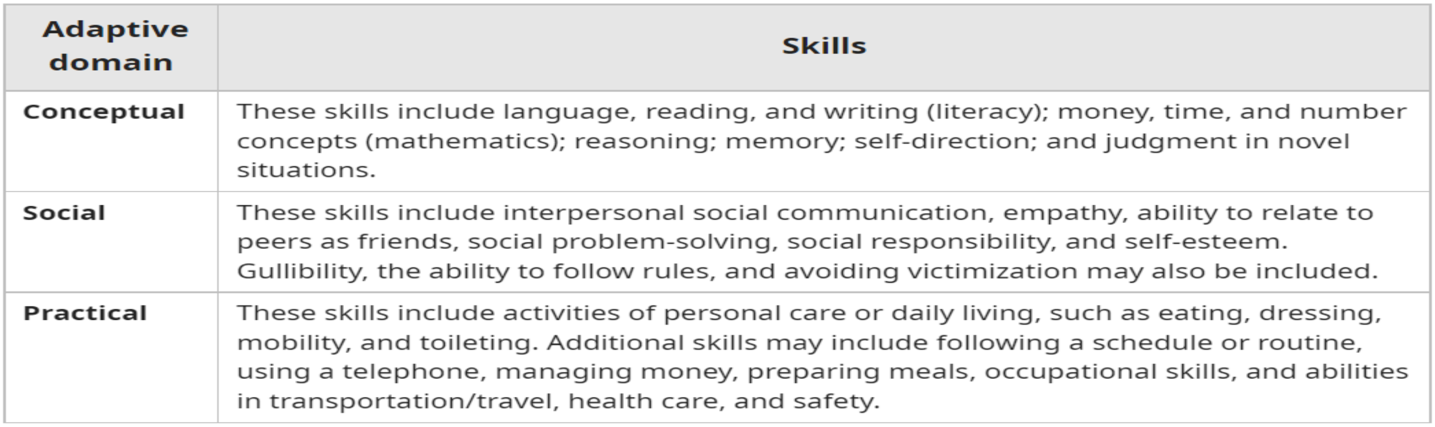
Environmental: TORCH Infections and environmental toxins or teratogens, Preterm birth, Hypoxia, Trauma, Intracranial hemorrhage, CNS hemorrhage or malignancy, Intracranial infection, Psychosocial deprivation, Malnutrition. Acquired/congenital hypothyroidism.



Diagnostic Criteria

Intellectual developmental disorder (intellectual disability) is a disorder with onset during the developmental period that includes both intellectual and adaptive functioning deficits in conceptual, social, and practical domains. The following three criteria must be met:

A. Deficits in intellectual functions, such as reasoning, problem solving, planning, abstract thinking, judgment, academic learning, and learning from experience, confirmed by both clinical assessment and individualized, standardized intelligence testing.
B. Deficits in adaptive functioning that result in failure to meet developmental and sociocultural standards for personal independence and social responsibility. Without ongoing support, the adaptive deficits limit functioning in one or more activities of daily life, such as communication, social participation, and independent living, across multiple environments, such as home, school, work, and community.
C. Onset of intellectual and adaptive deficits during the developmental period.



Adaptive domain	Skills
Conceptual	These skills include language, reading, and writing (literacy); money, time, and number concepts (mathematics); reasoning; memory; self-direction; and judgment in novel situations.
Social	These skills include interpersonal social communication, empathy, ability to relate to peers as friends, social problem-solving, social responsibility, and self-esteem. Gullibility, the ability to follow rules, and avoiding victimization may also be included.
Practical	These skills include activities of personal care or daily living, such as eating, dressing, mobility, and toileting. Additional skills may include following a schedule or routine, using a telephone, managing money, preparing meals, occupational skills, and abilities in transportation/travel, health care, and safety.

Screening:
Routine developmental and behavioral screening at the 9-month, 18-month, and 24- or 30-month visits and screening for autism spectrum disorder (ASD) at the 18- and 24-month visits.

Investigation:
Individualized investigation
Specific genetic testing, Metabolic screening, Thyroid function test, serum creatine kinase, Lead screening, Neuroimaging (MRI)

Management: Speech and language therapy, Occupational therapy, Physical therapy, Hearing, and vision services. Early education assessment and services, Functional living skills, Family-centered interventions, social support, Behavioral interventions, Consultation with a dietician.

learning disability:

Definition: Learning disabilities are a heterogeneous group of disorders characterized by the unexpected failure of an individual to acquire, retrieve, and use information competently. They are the most severe, pervasive, and chronic form of learning difficulty in children with average or above-average intellectual abilities.

Risk factors: family history, poverty and understimulating environments. premature baby with other developmental and mental health conditions, prenatal alcohol, neurologic, chromosomal disorders, certain chronic medical conditions (eg, type 1 diabetes mellitus, HIV infection), central nervous system infection or irradiation or traumatic brain injury.

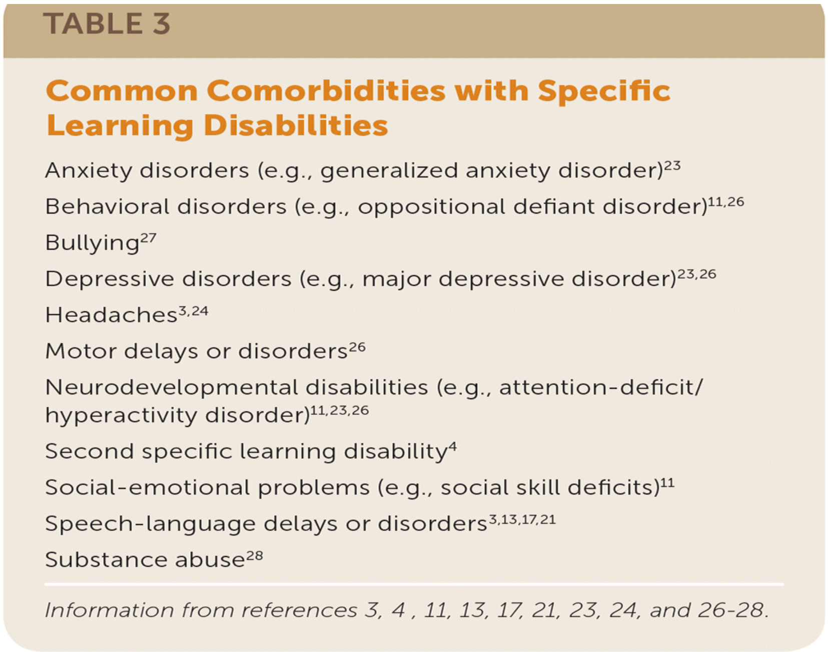


TABLE 3

Common Comorbidities with Specific Learning Disabilities

Anxiety disorders (e.g., generalized anxiety disorder)[23]
Behavioral disorders (e.g., oppositional defiant disorder)[11,26]
Bullying[27]
Depressive disorders (e.g., major depressive disorder)[23,26]
Headaches[3,24]
Motor delays or disorders[26]
Neurodevelopmental disabilities (e.g., attention-deficit/hyperactivity disorder)[11,23,26]
Second specific learning disability[4]
Social-emotional problems (e.g., social skill deficits)[11]
Speech-language delays or disorders[3,13,17,21]
Substance abuse[28]

Information from references 3, 4 , 11, 13, 17, 21, 23, 24, and 26-28.

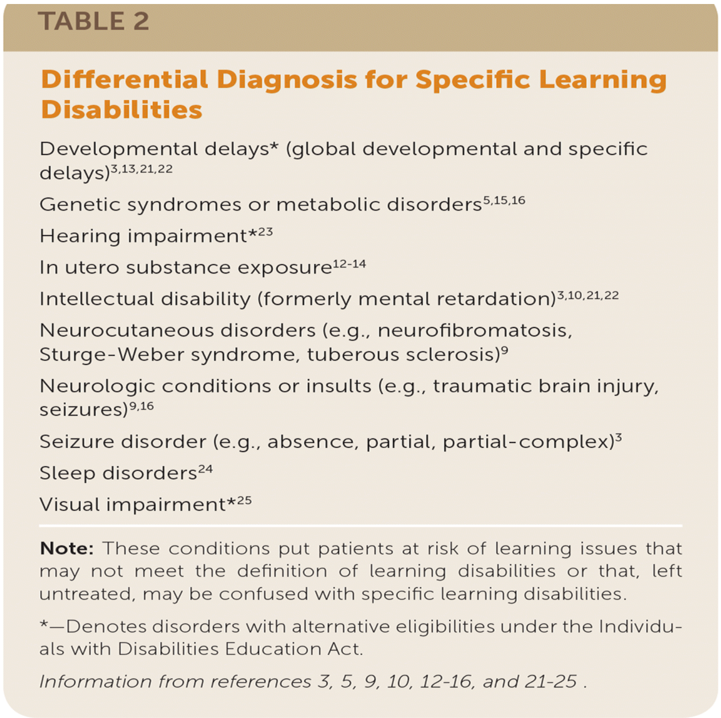


TABLE 2

Differential Diagnosis for Specific Learning Disabilities

Developmental delays* (global developmental and specific delays)[3,13,21,22]
Genetic syndromes or metabolic disorders[5,15,16]
Hearing impairment*[23]
In utero substance exposure[12-14]
Intellectual disability (formerly mental retardation)[3,10,21,22]
Neurocutaneous disorders (e.g., neurofibromatosis, Sturge-Weber syndrome, tuberous sclerosis)[9]
Neurologic conditions or insults (e.g., traumatic brain injury, seizures)[9,16]
Seizure disorder (e.g., absence, partial, partial-complex)[3]
Sleep disorders[24]
Visual impairment*[25]

Note: These conditions put patients at risk of learning issues that may not meet the definition of learning disabilities or that, left untreated, may be confused with specific learning disabilities.

*—Denotes disorders with alternative eligibilities under the Individuals with Disabilities Education Act.

Information from references 3, 5, 9, 10, 12-16, and 21-25 .

diagnosis of learning disability: history of the learning problem (educational history), classroom observations, and performance on a standardized or psychometric measure.

- Early identification of LD is necessary to provide appropriate interventions.

The goal of the medical evaluation: identifing medical, neurologic, and/or behavioral conditions that may be related to the LD or co-occur with the LD.
The educational and learning histories, are the most important aspects of the evaluation. The physical examination is usually normal but should include general observations and appearance, growth parameters, examination of the skin and genitalia, assessment of hearing and vision, and neurologic examination.

Learning disability	Clinical features*
Reading disability (dyslexia)	Difficulty identifying which letter/letter combination correlates with a particular sound (phonics and decoding), Difficulty reading printed text smoothly and efficiently (reading fluency), Difficulty understanding what was read (reading comprehension), May hav associated attention problems, May dislike or avoid reading
Writing disability (dysgraphia)	Difficulty with handwriting (eg, copying efficiently from the chalkboard), Difficulty with spelling (phonics, encoding), Difficulty composing sentences and text (eg, excessive grammar and punctuation errors), Overly simple written text, Written text that is difficult to follow because it is not properly organized
Math LD (dyscalculia)	Difficulty with mental representation of quantity (number sense), Difficulty performing math calculations (adding, subtracting, multiplying, dividing), Difficulty with automatic retrieval of basic calculations (eg, addition, subtraction) (math fluency), Difficulty correctly reading and understanding math symbols, Difficulty understanding word problems, Difficulty with visual-spatial and organization skills
Nonverbal LD (nonlanguage-based LD, right hemisphere developmental LD)¶	Weakness in visual spatial organization, Weakness in nonverbal problem solving (including social reasoning), Weaknesses in higher-order reading comprehension and written expression Weaknesses in attention and executive function, Well-developed basic language skills, Strong rote skills (eg, single-word reading or spelling)
Language-based LD	Difficulty discriminating and producing the sounds of spoken language, Difficulty with vocabulary and/or word retrieval, Difficulty understanding and correctly using grammar and syntax (word order), Difficulty with narrative discourse and conversation (pragmatics), Difficulty following instructions (poor verbal working memory), Difficulty with reading comprehension, Difficulty writing at the sentence or text level, resulting in grammatical errors, short sentences, or poorly structured paragraphs and text

Role of primary care provider: early identification and referral for diagnosis, if The child is diagnosed with an LD, the primary care provider can educate and counsel the family about LD, educational and psychosocial interventions, avoiding unproven therapies, service delivery decisions, legal rights, and resources, also can provide care coordination, advocacy, and support and help with mediation if there are disagreements between the family and the school team.

Approach to childhood mental and behavioral
MCQs

ABFM 2022

You diagnose attention-deficit/hyperactivity disorder in a 4-year-old female. Which one of the following would be the most appropriate first-line treatment?

A. Dietary modification
B. Vitamin supplementation
C. Behavioral intervention
D. Atomoxetine (Strattera)
E. Methylphenidate (Ritalin)

ANSWER: C

Attention-deficit/hyperactivity disorder in preschool children aged 4–5 years should be managed initially with behavioral intervention. Starting at age 6, pharmacologic medication such as atomoxetine or methylphenidate could be considered. There is no evidence of any benefit with dietary modification or vitamin supplementation.

ABFM 2021

A 14-year-old male is brought to your office by his parents, who are concerned about his behavior. Recently he was caught shoplifting video games. He started smoking cigarettes at age 10, and he has a history of truancy from school for the past 2 years. His parents report that they have caught him starting fires outside of their home, and he often teases the family dog, whom he has injured on several occasions.
The most likely diagnosis is:

A. Antisocial personality disorder
B. Attention-deficit/hyperactivity disorder (ADHD)
C. Avoidant personality disorder
D. Conduct disorder
E. Substance abuse

ANSWER: D

Conduct disorder most commonly occurs during adolescence and childhood. There are multiple criteria, including aggression toward people and animals, theft, starting fires, and truancy. It may be associated with other disorders. Antisocial personality disorder, which is usually diagnosed after age 18, involves a disregard for the rights of others. Symptoms of attention-deficit/hyperactivity disorder (ADHD) include inattention, impulsiveness, and hyperactivity. Avoidant personality disorder is characterized by avoidance of social situations and interactions with others. There is no evidence of substance abuse in this patient’s history.

An 18-month-old female is brought to your office for a well child check. During the examination you note that she is unable to say any words. She can follow a one-step command and point to three body parts. She does wave goodbye and babble, and she appears to have normal comprehension, emotional relationships, and fine and gross motor movements. Which one of the following is the most likely diagnosis based on this patient's speech development?

A. Autism spectrum disorder
B. Cerebral palsy
C. Congenital hearing loss
D. Developmental speech and language delay
E. Receptive language disorder

ANSWER: D

More than 90% of children can speak three words at 18 months of age and 50%–90% can speak six words. This patient scenario suggests a developmental speech delay. There is nothing in this case to suggest an autism spectrum disorder and the normal emotional relationships are reassuring. While cerebral palsy can be associated with speech and language delay due to spasticity of tongue muscles, the otherwise normal motor examination in this case rules this out. Her ability to follow commands indicates her hearing is likely normal. The child can follow commands and points to several body parts, which makes a receptive language disorder less likely.

ABFM 2020

A 37-year-old male sees you to discuss some mental health concerns. He states that he has recently been unable to meet deadlines at work and has been reprimanded by his boss. He feels he cannot complete the tasks during his work hours and is worried he is going to lose his job. Your evaluation indicates that he might have adult attention-deficit/hyperactivity disorder (ADHD). Which one of the following is true regarding adult ADHD?

A. Symptoms of ADHD must be present before age 6
B. Inattention does not persist into adulthood
C. Hyperactivity symptoms worsen into adulthood
D. Stimulants should not be prescribed in adults over the age of 30
E. Adults with ADHD should be screened for coexisting psychiatric disorders

ANSWER: E

Attention deficit/hyperactivity disorder (ADHD) is a common neurodevelopmental disorder in children and adolescents. Approximately 30% of children carry the diagnosis into adulthood. Individuals with ADHD should be screened for coexisting psychiatric disorders because they are at a higher risk for problems such as anxiety and depression and are more likely than the general population to have substance use disorders. The DSM-5 criteria for the diagnosis of adult ADHD require symptoms to have been present before age 12. Inattention often persists into adulthood, while hyperactivity and impulsivity usually improve with time. Compared to children with ADHD, hyperactivity in adults often presents as talkativeness, irritability, and restlessness. Along with behavioral strategies, stimulants have been found to be effective for treatment of adult ADHD. Although there are no age restrictions for the use of stimulants, adults should have their blood pressure and heart rate monitored during use to monitor for potential cardiac complications.

ABFM 2018-2015

A 2-year-old male is brought to your office for a well child examination. Developmental screening reveals that he has about a 10-word vocabulary. His mother attributes this to their bilingual home but admits she is concerned about autism. Which one of the following behaviors would provide additional evidence that the child may have autism?

A. Use of gestures rather than words to communicate ideas
B. Frequently being engrossed in pretend play with dolls
C. Becoming upset by normal noises
D. Seemingly excessive attempts to attract attention with his behavior
E. Repeated copying of parental facial expressions

ANSWER: C

Evidence shows that early treatment of autism is beneficial (SOR B), and the American Academy of Pediatrics recommends screening with a validated autism-specific tool such as the MCHAT at 18 and 24 months (SOR C). Delayed social development is typically the first sign of autism. Language delay can be another finding, but it is less specific. Of the behaviors listed, only abnormal sensitivity to sound is consistent with autism. Gesturing, pretend play, mimicking, and attempting to attract caregiver attention all suggest other diagnoses.

The American Academy of Pediatrics recommends administration of an autism-specific screening tool at which well child visits?

A. 18 and 24 months
B. 2 and 3 years
C. 3 and 5 years
D. 5 and 10 years
E. 10 and 12 years

ANSWER: A

Since early intensive behavioral therapy can improve functional outcomes for children with autism and autism spectrum disorders, early diagnosis is critical. The American Academy of Pediatrics recommends screening all children with an autism-specific screening instrument at 18 and 24 months in addition to surveillance of developmental issues at all well child visits.

A 36-month-old male has persistent deficits in social communication and interaction across multiple contexts. He displays restricted and repetitive patterns of behavior, interest, and activities. According to the DSM-5, which one of the following is the most appropriate diagnosis?

A. Asperger syndrome
B. Autism spectrum disorder
C. Autistic disorder
D. Childhood disintegrative disorder
E. Pervasive developmental disorder not otherwise specified

ANSWER: B

Key diagnostic features of autism spectrum disorder include deficits in social communication and interaction across multiple contexts and restricted, repetitive patterns of behavior, interests, or activities. The DSM-5, which came out in 2013, created an umbrella diagnosis of autism spectrum disorder to consolidate four previously separate disorders: autistic disorder, Asperger’s disorder, childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified. Any individuals with a previous diagnosis of one of these disorders should now be given a diagnosis of autism spectrum disorder.

Intensive behavioral intervention has more benefit than other treatment modalities in treating children who have been diagnosed with :

A. Attention-deficit/hyperactivity disorder
B. Autism
C. Depression
D. Obsessive-compulsive disorder
E. Posttraumatic stress disorder

ANSWER: B

The only evidence-based treatment that confers significant benefits to children with autism is intensive behavioral interventions, which should be initiated before 3 years of age. Attention-deficit/hyperactivity disorder can be treated with cognitive-behavioral therapy (CBT) but medication is often required. CBT is as effective, if not more effective, than medication for treating anxiety, depression, and trauma-related disorders.

An 8-year-old male is diagnosed with attention-deficit/hyperactivity disorder. Which one of the following is the most effective treatment?

A. Behavioral therapy
B. Atomoxetine (Strattera)
C. Bupropion (Wellbutrin)
D. Psychostimulants such as methylphenidate (Ritalin) and dextroamphetamine (Dexedrine)
E. "2-Receptor agonists such as guanfacine (Tenex)

ANSWER: D

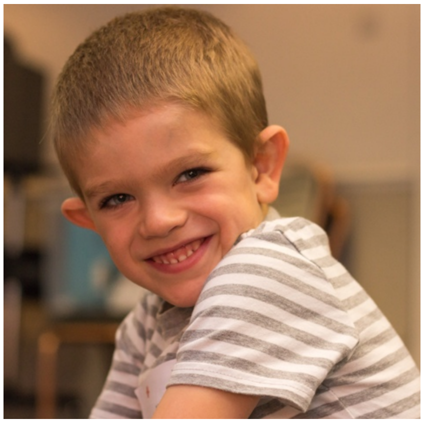
Psychostimulants are the most effective medication option for treating attention-deficit/hyperactivity disorder (ADHD) and are widely accepted as first-line therapy. Behavioral therapy is recommended before considering medications for children under the age of 6, and may be considered for older children but may not add much benefit in this age group, particularly when there is a good response to medication. Atomoxetine and the "2-receptor agonist guanfacine are considered second-line agents because of lower effectiveness against core ADHD symptoms and a greater frequency of side effects. Bupropion has been used off-label for ADHD but is not FDA approved for this indication.

A 4-year-old male is brought to your office by his maternal aunt, who is his new guardian. She is concerned that he is exhibiting problems with behavior and attention. On examination you note long, wide, protruding ears, an elongated face, and frontal bossing. Which one of the following is the most likely cause of these dysmorphic features?

A. Angelman syndrome
B. Fragile X syndrome
C. Klinefelter syndrome
D. Marfan syndrome
E. Prader-Willi syndrome

ANSWER: B

The prepubescent male child with fragile X syndrome can be recognized by large ears, an elongated face, macrocephaly, or frontal bossing. This dysmorphic presentation can be subtle in young children, with an average age at diagnosis of 8 years. After puberty, a prominent jaw and macro-orchidism is characteristic. Although a child with Marfan syndrome has an elongated face, the frontal bossing and large ears are not characteristic of that condition. Prepubescent boys with Klinefelter syndrome do not have facial dysmorphic features. They appear similar to prepubescent boys with normal karyotypes. Facial dysmorphic features associated with Angelman syndrome include microbrachycephaly, maxillary hypoplasia, a large mouth, and prognathism. Facial dysmorphic features associated with Prader-Willi syndrome include a narrow distance between the temples, almond-shaped eyes, and a thin upper lip.



A 26-year-old male graduate student presents with concerns about having attention-deficit disorder (ADD). He reports inattentiveness and a lack of concentration for the last 2–3 years, resulting in poorer academic performance than when he was an undergraduate. He says his wife also complains of his lack of focus and attentiveness when attending to household responsibilities. He does not recall having similar symptoms in grade school or high school. You explain that in order to diagnose adult ADD

A. evidence of symptoms of ADD must be present before age 6
B. evidence of symptoms of ADD must be present before age 12
C. a therapeutic trial of a short-acting dextroamphetamine/amphetamine combination (Adderall) is indicated
D. a therapeutic trial of an SNRI such as atomoxetine (Strattera) is indicated

ANSWER: B

Diagnosing attention-deficit disorder in adults requires symptoms that interfere with social, academic, or occupational functioning and are present in more than one setting. DSM-5 states that a history of symptoms before age 12 is required for the diagnosis. DSM-IV specified that symptoms must have been present before age 7.

The parents of a 5-year-old male bring him in for evaluation of likely attention deficit/hyperactivity disorder. You have suspected this diagnosis for some time, and the parents have brought in surveys filled out by themselves and the child's kindergarten teacher which confirm your suspicions. The most appropriate initial treatment is

A. behavioral therapy
B. "2-receptor agonists such as guanfacine (Intuniv, Tenex)
C. psychostimulants such as methylphenidate (Ritalin)
D. atomoxetine (Strattera)

Answer: A

Behavioral therapy should be the primary treatment for attention-deficit/hyperactivity disorder (ADHD) in children younger than 6 years, and it may be helpful at older ages (SOR B). Treatment of ADHD in children 6 years and older should start with medication (SOR B).

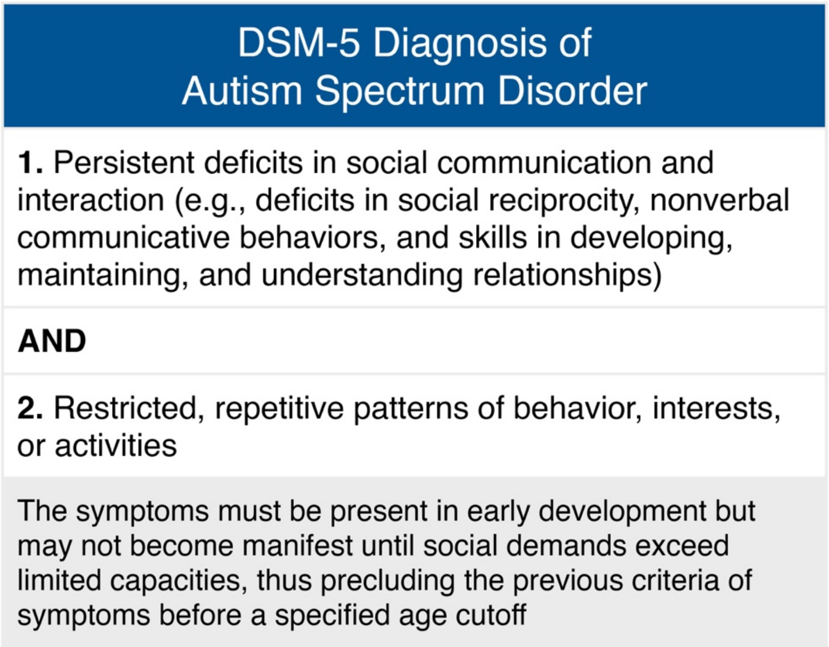
ROSH

A new mother presents to your clinic with her newborn. She reports she does not want her child receiving vaccinations because she read that there is a strong link to autism. Which of the following could you tell the patient?

A. The flu vaccine is the only vaccine associated with increased autism risk
B. There have been no changes to the mercury content in vaccines
C. There is no link between vaccines and autism
D. Thimerosal is the main ingredient known to cause autism

ANSWER: C

There is no link between vaccines and autism. Autism spectrum disorder is a developmental disability that is associated with many possible etiologies, including genetic, environmental, prenatal, perinatal, and in-utero factors. It is characterized by difficulty with social communication and restricted, repetitive patterns of behavior, interest, or activities. Therefore, children with autism spectrum disorder may communicate, interact, behave, and learn in different ways. A recent, common concern regarding autism has been that childhood vaccines may be a risk factor for the development of autism. This has been conclusively disproved. A study by the Institute of Medicine and the Centers for Disease Control and Prevention found no link between vaccines and autism spectrum disorder.



DSM-5 Diagnosis of Autism Spectrum Disorder
1. Persistent deficits in social communication and interaction (e.g., deficits in social reciprocity, nonverbal communicative behaviors, and skills in developing, maintaining, and understanding relationships)
AND
2. Restricted, repetitive patterns of behavior, interests, or activities
The symptoms must be present in early development but may not become manifest until social demands exceed limited capacities, thus precluding the previous criteria of symptoms before a specified age cutoff

The flu vaccine is the only vaccine associated with increased autism risk (A) **is incorrect. The flu vaccine is the only vaccine to have moderate amounts of thimerosal, however, thimerosal-free alternative flu vaccines are available. The flu vaccine is not associated with an increased autism risk.** There have been no changes to the mercury content in vaccines (B) **is incorrect. Between 1999 and 2001, there was a broad national effort to reduce all types of mercury exposure in children to complete removal or trace amounts, including reduction or complete removal of mercury in childhood vaccines. As mentioned, the flu vaccine is the only vaccine that has moderate amounts of thimerosal.** Thimerosal is the main ingredient known to cause autism (D) **is incorrect. Thimerosal is a mercury-based preservative used to prevent contamination of multidose vials of vaccines. Since 2003, there have been nine Centers for Disease Control and Prevention-funded or conducted studies that found no link between thimerosal-containing vaccines and autism**

A 2-year-old boy presents to the clinic with behavioral abnormalities over the past six months. His mother states that he seems to behave strangely when he plays. He does not like running or walking around, and he prefers to sit in one spot with one toy at a time. When his mother or father approach him, he will greet them verbally but does not raise his head or make eye contact with them. He knows many words but speaks in one- or two-word commands, such as “no mama”, “eat snack”, or “video”. When brought to the playground or activity group, the boy does not seem interested in playing with other children unless they are playing with a toy he is interested in. His mother reports that he is not prone to misbehaving or tantrums, rather he is quite docile and even a little lethargic. He has done well with babysitters in the past, but they report that he does not make eye contact with them, although he does communicate his needs to them. As an infant, the boy was delayed in sitting up, crawling, and walking (e.g., he took his first steps at 18 months old). Aside from gross motor development, he met the other milestones during his first two years of life. He has never been diagnosed with any medical condition and he has generally been healthy, but in the past half year he has appeared to be more withdrawn and not as lively. Vital signs include BP 111/72 mm Hg, HR 91 bpm, and T 98.2 °F. The physical examination is normal. Which of the following findings in this child counts as one of the required criteria for diagnosing autism spectrum disorder?

A. Delayed gross motor development
B. Disinterest in play with other children unless they have a toy that he wants
C. Lack of making eye contact with others

D. Speaking only in one- or two-word commands

ANSWER: C

Autism spectrum disorder is the name of a group of neurodevelopmental disorders characterized by impairments in social interaction and communication, as well as repetitive behaviors and restricted interests. The updated Diagnostic and Statistical Manual of Mental Disorders, 5th Edition published by the American Psychiatric Association has included significant changes from previous editions in the way autism spectrum disorder is defined and diagnosed. According to the updated definitions, patients being diagnosed with autism spectrum disorder must fulfill two main criteria: 1) impaired social interaction and communication, and 2) restricted and repetitive patterns of behavior or interests. Within the first main criteria, three sub-criteria must be met: 1) impaired social-emotional reciprocity (e.g., abnormal back and forth conversation, impaired affect and emotional response), 2) impaired nonverbal communicative behaviors (e.g., **abnormalities in eye contact** and body language, impaired understanding of nonverbal gestures), and 3) deficits in developing and maintaining relationships (e.g., difficulty making friends, absence of interest in people). Within the second main criteria, two out of four sub-criteria must be met: 1) repetitive speech or movements, 2) excessive adherence to routines or excessive resistance to change, 3) highly restricted and fixated interests, and 4) hyper- or hyporeactivity to sensory input. All symptoms must be present in early childhood and should be relative to the patient's appropriate developmental level. The boy in the question has some behaviors that might be suggestive of autism spectrum disorder; of the answer choices listed, the most relevant symptom is his **lack of eye contact** with his parents and other caregivers. This symptom would fulfill the second sub-criteria of the first main criteria required for making the diagnosis.

Delayed gross motor development (A) **is not a criteria or aspect of autism spectrum disorder, although autism spectrum disorder has been associated with concomitant motor development delay. The boy's** disinterest in play with other children unless they have a toy that he wants (B) **is relatively appropriate for his age and development. It is not uncommon for children of his age to play largely by themselves even when around others (i.e., parallel play), or to be more interested in other children's toys than in the children themselves.** Speech in only one- or two-word commands (D) **is also developmentally appropriate for this boy's age. Children typically know a number of words and start to form short, two-word sentences by two years of age.**

Which of the following is correct with regards to autism?

A. Caused by thimerosal-containing vaccines
B. Developmental screening tests have good sensitivity for autism
C. Early intervention with a multidisciplinary approach improves outcomes
D. Onset typically occurs after the age of 5

ANSWER: C

Early intervention with a multidisciplinary approach improves autism outcomes. The term autism refers to a spectrum of **pervasive developmental disorders** characterized by various degrees of **impaired social interaction** and **communication** and **repetitive**, **stereotyped patterns of behavior**. These patients like aloneness, are hypersensitive to touch, desire sameness in every day activity, often have a lack of understanding, and can have good rote memory skills. Patients may have relatively good skills in one area and very poor skills in others. The incidence of autistic disorder is 5 to 20 per 10,000 persons, with a much higher occurrence among siblings of affected patients. Evidence is mounting that both genetic and environmental factors influence the etiology of autism.

Assertions that autism is caused by thimerosal-containing vaccines (A) **have been discounted by a comprehensive meta-analysis.** Standard developmental screening tests (B) **have poor sensitivity for autism. A variety of screening tools aimed specifically at autism are available but also lack sensitivity. Therefore, physicians should take parental concerns about delayed speech and language development seriously, especially beyond 18 months of age, even in the context of normal screening. Autistic disorder has onset before age 3 years not after** 5 years of age (D)**.**

A 3-year-old boy presents to your office for a routine annual checkup. His mother is concerned about his lack of interest in children his own age. They have attempted to participate in multiple playgroups and activities but he ends up playing on his own in a corner. His favorite toy is a spinning top, which gets rest only at bedtime. He is able to speak only about 10 words and they are difficult to understand. His mother is also worried about nutrition as he eats applesauce, bread, and cold cheese, and nothing else. She apologizes for his dirty appearance and reports that he will wear only one of two red shirts without throwing a temper tantrum. The other shirt is in the wash. Which of the following statements regarding treatment of autism spectrum disorder is correct?

A. Aripiprazole will improve cognitive function
B. Early behavioral interventions for at least five hours a week is recommended
C. There is no role for complementary or alternative treatment modalities
D. There is no single medical therapy that is effective for all symptoms

ANSWER: D

Autism spectrum disorder is an umbrella term for the previously defined conditions of Asperger syndrome, autistic disorder, childhood disintegrative disorder, and pervasive development disorder. Patients are typically diagnosed in early childhood with **social communication difficulties and repetitive and restrictive behaviors/activities/interests**. While the United States Preventive Services Task Force has found that there is insufficient evidence to recommend for or against screening, many experts and state Department of Human Services insurance administrators (Medicaid) may require the use of a validated screening tool as part of their well-child exams through the age of 6. The etiology of autism spectrum disorders appears to be multifactorial, including genetics, prenatal maternal risk factors, and environmental exposures. There is no contribution from thimerosal-containing vaccines. Other conditions often associated with the disorder include insomnia, epilepsy, psychiatric conditions (ADD/depression/anxiety), motor impairments, intellectual disabilities, and gastrointestinal dysfunction. A small percentage of children will not meet criteria as adults and will obtain normal intellectual and social functioning. The majority of children, however, will have the same severity level as they mature, with only a small percentage demonstrating improvement or worsening of their functional classification. Indicators of successful adult transition include employment, friendships, marriage, and the ability to live independently. There are numerous medical/behavioral options to improve function and manage symptoms, but **there is no single medical therapy that is effective for all symptoms**.

Aripiprazole (A) and risperidone are approved by the U.S. Food and Drug Administration to help treat irritability, aggression, explosive outbursts, and self-injury that is often present in autism spectrum disorders, but there is no evidence that either of these agents will improve cognitive function. Additionally, these medications have significant potential adverse side effects and risk versus benefit must be heavily weighed. **Early behavioral interventions for at least 25 hours a week is recommended (B)** for young children between the ages of 2–7 years old. Cognitive behavioral therapy improves anxiety in children and adolescents with average or above-average IQs. **There is evidence that complementary or alternative treatment modalities may have a role in reducing symptoms associated with autism spectrum disorder**

(C). Melatonin, massage, and therapeutic horseback riding are among those with some qualifying literature support.

A 3-year-old boy is brought to the clinic by his mother due to concerns about his behavior. At daycare, he sits quietly alone in the corner and does not seem to interact with the other children. He continuously rocks back and forth and sways side-to-side. He also has delayed speech development. Which of the following is the most likely diagnosis?

A. Angelman syndrome
B. Autism spectrum disorder
C. Down syndrome
D. Fragile X syndrome

ANSWER: B

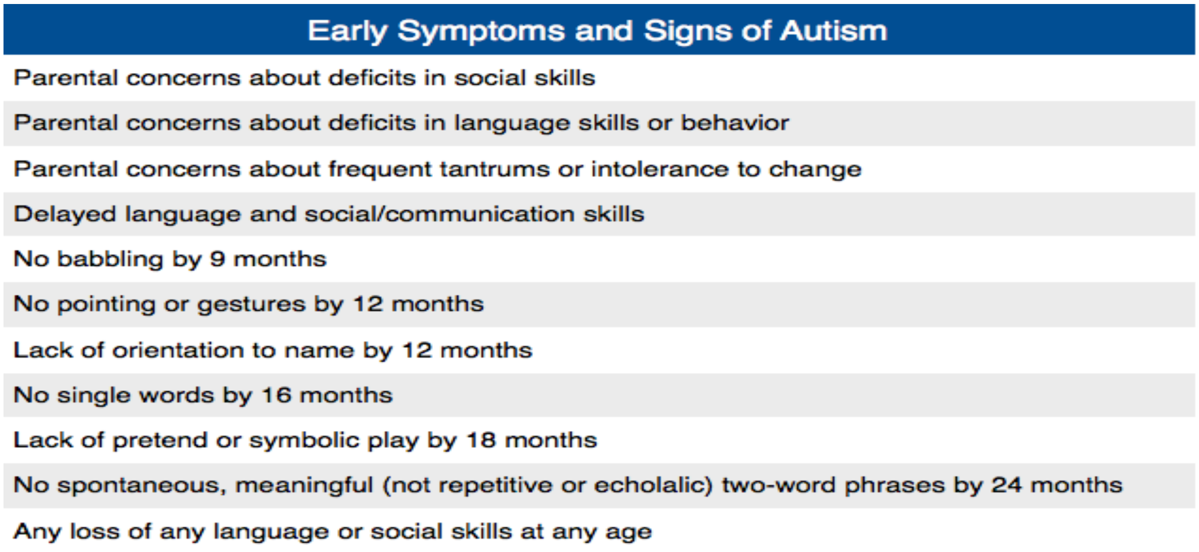
Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by impairments in **social communication and interaction,** and **repetitive patterns of behavior** (e.g., rocking, swaying, hand-flapping), **interests**, and **activities**. ASD encompasses disorders previously known as autistic disorder, childhood disintegrative disorder, pervasive developmental disorder-not otherwise specified, and Asperger disorder. No definite etiology has been established, but research has shown that environmental exposures and genetics likely play a role. No association between vaccinations and autism has been demonstrated. **Angelman syndrome (A)** is a neurodevelopmental disorder that presents with severe intellectual disability, postnatal microcephaly, ataxia, and seizures. **Down syndrome (C)** is usually diagnosed through routine prenatal screening and testing, and it can be recognized in the newborn soon after birth. These patients typically present with characteristic dysmorphic features such as upslanting palpebral fissures, epicanthic folds, flat nasal bridge, low-set small ears, protruding tongue, and short neck. **Fragile X syndrome (D)** is the most common form of inherited intellectual disability. Classic features consist of a long and narrow face (with prominent forehead and chin), large ears, testicular enlargement, macrocephaly, and intellectual disability.

An 18-month-old girl presents to the clinic for a wellness visit. Her mother is concerned about her social and language skills. Which of the following is an example of the earliest sign or symptom of autism?

A. Lack of pretend or symbolic play by 24 months of age
B. No babbling by 9 months of age
C. No pointing or gestures by 15 months of age
D. No single words by 12 months of age

ANSWER: B

Autism spectrum disorder includes an array of neurodevelopmental disorders that are characterized by impairments in social communication, reciprocal social interaction, and behavior. These include autistic disorder, childhood disintegrative disorder, atypical autism, Asperger disorder, and pervasive developmental disorder. Because earlier intervention has shown to be effective, the American Academy of Pediatrics recommends screening all children at 18 and 24 months of age for autistic spectrum disorder, as this is an important period for early language and social development. Further, autistic spectrum disorder screening should be performed in children with delayed language/communication milestones, regression in social or language skills, in children whose caregiver raises concerns regarding autistic spectrum disorder, and children with a sibling diagnosed with autistic spectrum disorder. Early signs and symptoms of autism include no babbling by 9 months, lack of orientation by 12 months, and no spontaneous, meaningful (not repetitive or echolalic) two-word phrases by 24 months. Specific screening tools include the Modified Checklist for Autism in Toddlers (M-CHAT), Early Screening of Autistic Traits (ESAT), and the Screening Tool for Autism in Toddlers and Young Children.



Early Symptoms and Signs of Autism
Parental concerns about deficits in social skills
Parental concerns about deficits in language skills or behavior
Parental concerns about frequent tantrums or intolerance to change
Delayed language and social/communication skills
No babbling by 9 months
No pointing or gestures by 12 months
Lack of orientation to name by 12 months
No single words by 16 months
Lack of pretend or symbolic play by 18 months
No spontaneous, meaningful (not repetitive or echolalic) two-word phrases by 24 months
Any loss of any language or social skills at any age

Lack of pretend or symbolic play by 24 months of age (A) is incorrect because this should occur by 18 months. No pointing or gestures by 15 months of age (C) is incorrect, as this should be evident by 12 months. No single words by 12 months of age (D) is incorrect, as this may not be present until 16 months.

A 6-year-old boy is brought to the clinic due to problems with making friends at his new school. His teacher states that he does not seem to enjoy playing with others and typically plays by himself. When he does want to play with others, he will try to solicit their attention by pushing them. His mother also notes that he has always avoided looking directly into her eyes. In addition, he repetitively flaps both hands. Which of the following is the most likely diagnosis?

A. Attention-deficit/hyperactivity disorder
B. Autism spectrum disorder
C. Friedreich ataxia
D. Rett syndrome

ANSWER: B

Autism spectrum disorder is a neurodevelopmental disorder that is characterized by **impairment in social interaction** and **restricted repetitive and stereotyped patterns of behaviors**, **interests**, **and activities**. The etiology is unknown, and the male to female ratio is about 5:1. The average age of diagnosis is 11 years because many symptoms may not be apparent to caregivers or are below the threshold of clinical concern. Symptoms may be initially noticed when parents and teachers question social development or a lack of social awareness at school. Core social features include marked impairments in the use of multiple nonverbal behaviors, failure to develop peer relationships, lack of social or emotional reciprocity, and a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people. Restricted repetitive and stereotyped patterns include persistent preoccupations with parts of objects, stereotyped and repetitive motor mannerisms (e.g., hand flapping), inflexible adherence to routines or rituals, and an encompassing preoccupation with one or more stereotyped and restricted patterns of interest that are abnormal either in focus or intensity. Autism spectrum disorder includes a wide range of individuals from those with mild impairment without intellectual disability (or even higher than normal intellect) to those with severe impairment. Management requires a **multidisciplinary approach** including speech therapy and behavioral and educational interventions.

Children with **attention-deficit/hyperactivity disorder (A)** demonstrate normal pragmatic language skills and lack the restricted, repetitive patterns of activities, behavior, or interests characteristic of autism spectrum disorder. **Friedreich ataxia (C)** is an autosomal recessive degenerative disorder that clinically manifests with limb and gait ataxia in the adolescent years. **Rett syndrome (D)** is a neurodevelopmental disorder caused by mutations in the *MECP2* gene and occurs almost exclusively in females. Affected children develop normally for the first 6 months of life, then develop deceleration of head growth followed by the loss of fine motor, intellectual, and communication skills around 12 to 18 months of life.

A 2-year-old girl presents to the clinic with her mother. Her mother says she has noticed a dramatic change in her behavior during the past several months. On several occasions, she noticed her rocking and swaying, while continuously flapping and twisting her hands. She frequently repeats phrases while watching cartoons and television programs, and she shows no interest in responding to others. Physical examination is unremarkable. Which of the following is the most likely diagnosis?

A. Attention-deficit/hyperactivity disorder
B. Autism spectrum disorder
C. Down syndrome
D. Fragile X syndrome

ANSWER: B

Autism spectrum disorder is characterized by **atypical social communication** and **restricted** and **repetitive behaviors** (e.g., rocking and swaying, hand flapping). Patients typically present within the **first 2 years of life**. Other signs and symptoms of autism spectrum disorder can include **language impairment or deficits**, **intellectual disability**, **motor deficits**, **macrocephaly**, and **stereotyped behaviors**. Diagnosis is based on meeting criteria defined by the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders or the ICD-11. Treatment of patients with autism spectrum disorder typically consists of **behavioral and educational interventions** and the symptomatic management of any other comorbidities, such as anxiety, sleep disorder, or depression.

Attention-deficit/hyperactivity disorder (A) usually presents with an inability to sustain attention and excessive motor activity (e.g., restlessness). Repetitive patterns of behavior and deficits in social communication are not seen in attention-deficit/hyperactivity disorder. **Down syndrome (C)** typically presents with characteristic facial features (flat occiput, macroglossia, epicanthal folds), intellectual disability, and other associated conditions (e.g., congenital heart disease). **Fragile X syndrome (D)** is the most common cause of inherited intellectual disability and typically presents with a long and narrow face, large ears, enlarged testes, macrocephaly, and intellectual and behavioral deficits. Fragile X syndrome is an X-linked disorder and primarily affects men.

16-year-old adolescent boy with moderate intellectual disability presents to your clinic with his father because of his behavior in school. He is now in eleventh grade with an individualized educational plan for his intellectual disability. He is post pubertal with a normal body mass index. His father reports that recently he seems ambivalent to go to school or participate in family gatherings. He is “clingy” and having a hard time sleeping. Which of the following is the most appropriate next step?

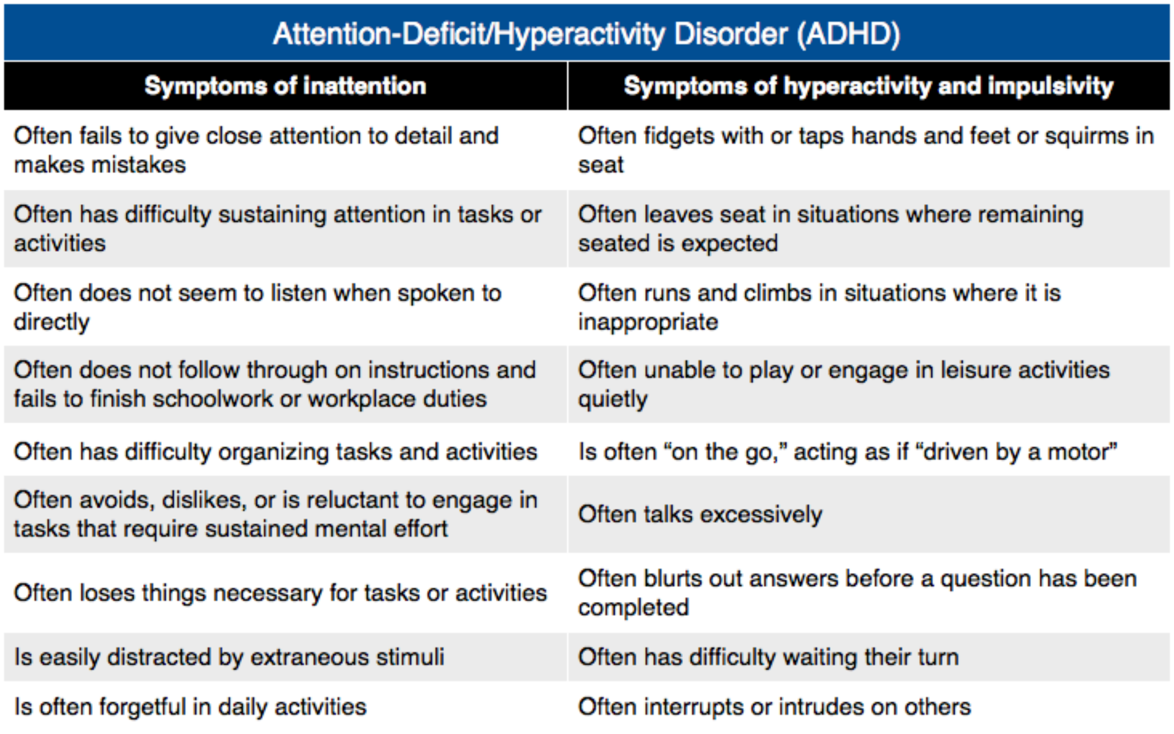
A. Encourage the boy to participate in sports, as exercise will help both his physical and mental health
B. Make a referral to the child psychiatrist as mental health disorders occur more frequently in adolescents with intellectual disability
C. Reassure the parent that this is normal and that his behavior may be due to adjustment reaction to school and puberty
D. Recommend setting an appointment with his individualized education program team to re-evaluate his plan, as this is most likely a response to his schoolwork becoming too difficult

ANSWER: B
Adolescents with intellectual disabilities are at increased risk for mental and physical health disorders**compared to adolescents without intellectual disabilities. The boy in this vignette is exhibiting signs of anxiety and would** likely benefit from an evaluation by a child psychiatrist **who could recommend treatment options. Boys with intellectual disabilities are more likely than girls with intellectual disabilities to have a psychiatric disorder.**
Although an exercise program (A) **has benefits in a person's physical and mental health in general, it is not the best initial intervention to recommend in this situation.** Providing reassurance to his parent and saying that this is due to adjustment reaction to school and puberty (C) **is inappropriate because the boy's symptoms are already impacting his day to day functioning (e.g., school performance, family relationships and sleep) which warrant intervention.** Recommending re-evaluation of his individualized education plan (D) **may be an appropriate course of action, especially coming up with behavior plan for his anxiety; however, this option only addresses academic and school functioning, not his family relationship or his sleep issues.**

A 5-year-old boy presents to the clinic for follow-up on possible attention-deficit/hyperactivity disorder. You look at the assessments the family has brought from home and from school, along with the criteria from the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders. You determine that a diagnosis of attention-deficit/hyperactivity disorder is appropriate in this child. Which of the following is the best next step in treatment?

A. Atomoxetine
B. Behavioral therapy
C. Guanfacine
D. Methylphenidate

ANSWER: B
For children younger than 6 years who are diagnosed with attention-deficit/hyperactivity disorder (ADHD), behavioral therapy is the initial treatment of choice, with medications reserved for children who respond poorly to behavioral therapy or have moderate to severe symptoms. ADHD is the most common pediatric behavioral disorder, and early identification and treatment of children with ADHD may lead to improved educational, work, and social outcomes. ADHD should be considered in children who show symptoms such as distractibility, hyperactivity, impulsiveness, or behavioral problems at home and at school. After conducting a thorough history and physical, the diagnosis should be made using the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders as well as validated behavioral setting scoring tools. For children younger than 6 years, effective behavioral therapies include parent training, classroom management, peer interventions, or a combination of these treatments.



Attention-Deficit/Hyperactivity Disorder (ADHD)

Symptoms of inattention	Symptoms of hyperactivity and impulsivity
Often fails to give close attention to detail and makes mistakes	Often fidgets with or taps hands and feet or squirms in seat
Often has difficulty sustaining attention in tasks or activities	Often leaves seat in situations where remaining seated is expected
Often does not seem to listen when spoken to directly	Often runs and climbs in situations where it is inappropriate
Often does not follow through on instructions and fails to finish schoolwork or workplace duties	Often unable to play or engage in leisure activities quietly
Often has difficulty organizing tasks and activities	Is often "on the go," acting as if "driven by a motor"
Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort	Often talks excessively
Often loses things necessary for tasks or activities	Often blurts out answers before a question has been completed
Is easily distracted by extraneous stimuli	Often has difficulty waiting their turn
Is often forgetful in daily activities	Often interrupts or intrudes on others

Atomoxetine (A) and guanfacine (C) are nonstimulant medications for the treatment of ADHD. Pharmacotherapy should be used in children 6 years of age or older, however, nonpsychostimulants are second-line treatments for ADHD. Methylphenidate (D) is a psychostimulant medication and is considered first-line treatment for ADHD in children 6 years of age or older. Behavioral therapy can also be offered to children aged 6 years or older, especially if response to medication is poor or associated with adverse side effects.

Which of the following non-stimulant medications has proven efficacy for the treatment of adult attention deficit hyperactivity disorder (ADHD)?

A. Atomoxetine
B. Clonidine
C. Guanfacine
D. Phenelzine

ANSWER: A

Atomoxetine is a **non-stimulant medication** classified as an atypical antidepressant and acts to increase norepinephrine and dopamine at the synapses. Numerous clinical trials and meta-analyses have shown significant efficacy of atomoxetine over placebo in **reduction of attention deficit hyperactivity disorder (ADHD) symptoms**, improvement in cognitive functioning, and overall improved quality of life. Atomoxetine is metabolized through the CYP450 system and thus can be hepatotoxic, so liver function tests should be monitored before and several months after initiation of therapy and at intervals for the duration of therapy. Prolongation of QTc has also been demonstrated with atomoxetine therapy. A black box warning exists for increased risk of suicide in patients under 25 years of age. Adverse effects include dry mouth, decreased appetite, nausea, dizziness, urinary hesitancy, decreased libido, and erectile dysfunction. Dosage should be started at 40 mg/day (given once or twice daily) and increased to 80 mg/day. If an adequate response is not achieved, a maximum dose of 100 mg/day can be used.

Clonidine (B) and **guanfacine (C)** are alpha-2-adrenergic agonists, medications commonly used in pediatric attention deficit hyperactivity disorder (ADHD), usually as third-line agents or in conjunction with stimulant therapy. Small studies in the adult population have not shown this class of medications to be effective for adult ADHD, and given the side effects of bradycardia, sedation, and rebound hypertension (of clonidine specifically), they are only used as fourth-line or last resort treatment options for adult ADHD. **Phenelzine (D)** is a monoamine oxidase inhibitor (MAOI), the first class of antidepressants used clinically. Significant adverse effects, including hypertensive crisis, increased risk of serotonin syndrome when combined with other serotonergic agents, sleep disturbances, and sexual dysfunction, limit the use of this class of medications. Clinical trials did not show improved efficacy of MAOIs over placebo for adult ADHD.

You are covering for another physician in your clinic and notice the next patient on the schedule needs an evaluation for pediatric attention-deficit/hyperactivity disorder. Which of the following scoring systems has the best combination of sensitivity and specificity for diagnosing attention-deficit/hyperactivity disorder in children and adolescents?

A. Child Behavior Checklist–Attention Problems Scale
B. Conners Abbreviated Symptom Questionnaire
C. Vanderbilt Attention-Deficit/Hyperactivity Disorder Diagnostic Parent Rating Scale
D. Vanderbilt Attention-Deficit/Hyperactivity Disorder Diagnostic Teacher Rating Scale

ANSWER: B

A 2016 meta-analysis published in *Pediatrics* comparing the Child Behavior Checklist–Attention Problems Scale and three versions of the Conners Ratings Scales–Revised showed that the **Conners Abbreviated Symptom Questionnaire** has the best combination of sensitivity and specificity when used to diagnose **attention-deficit/hyperactivity disorder** (ADHD) in patients from age 3–18 years. ADHD is the most common behavioral disorder in children and should be considered in children who show symptoms such as **distractibility**, **hyperactivity**, **impulsiveness**, or behavioral problems in multiple settings such as at home and at school. After conducting a thorough history and physical, the diagnosis should be made using the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders as well as validated behavioral setting scoring tools. The Conners Abbreviated Symptom Questionnaire is the most effective ADHD-specific rating scale because of its short length (10 items) and high diagnostic accuracy.

The **Child Behavior Checklist–Attention Problems Scale (A)** is a widely used scoring tool for the diagnosis of ADHD, however, it does not have as strong of a sensitivity or specificity as the Conners Abbreviated Symptom Questionnaire. However, because of its wide use, the Child Behavior Checklist–Attention Problems Scale may be an appropriate tool for more comprehensive assessments, as the Conners Abbreviated Symptom Questionnaire is shorter. The **Vanderbilt ADHD Diagnostic Parent Rating Scale (C)** and **Vanderbilt ADHD Diagnostic Teacher Rating Scale (D)** were historically used frequently, however, it was observed that the Vanderbilt parent scale had poor specificity and the teacher scale has poor sensitivity.

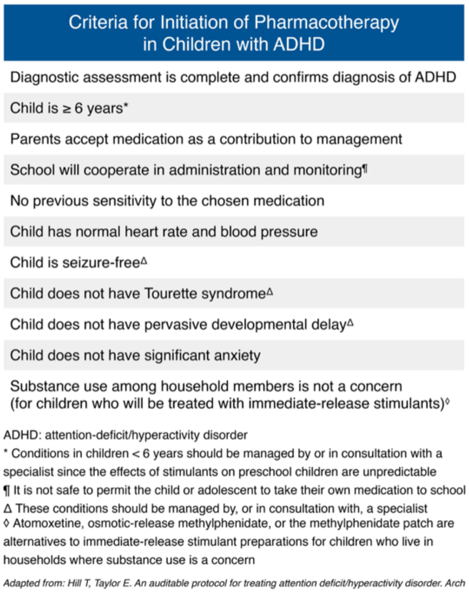
A 5-year-old boy and his mother present to the clinic with concerns about attention deficit hyperactivity disorder. Since starting kindergarten six months ago, teachers have made comments about his behavior at school. At a recent parent-teacher conference, the teacher stated that he has difficulty remaining seated, squirms in his seat, frequently blurts out answers too quickly, and interrupts others. Mom has also noticed this behavior in the home setting and describes that he is a “very active child.” Which of the following is the next best step in management?

A. Atomoxetine
B. Behavioral therapy

C. Elimination diet
D. Methylphenidate

ANSWER: B

Attention deficit hyperactivity disorder (ADHD) is the most common behavioral disorder in children. Symptoms manifest in childhood with two groups of symptoms: inattention and hyperactivity/impulsivity. According to the DSM-5, diagnosis of ADHD must include at least six symptoms of inattention or at least six symptoms of hyperactivity and impulsivity. The symptoms also must **impair function in academic or social activities**, occur often, persist **at least six months**, manifest **before 12 years of age**, be **present in more than one setting**, and be excessive for the developmental level of the child. It is important to rule out other psychological or physical conditions that could explain the symptoms. Common symptoms of hyperactivity include excessive talking, blurting out answers too quickly, interrupting others, excessive fidgetiness, difficulty remaining seated, difficulty waiting turns, difficulty playing quietly, and always seeming to be "on the go." **Behavioral therapy is the mainstay of treatment for children < 6 years of age**. For children ≥ 6 years of age, combined behavioral and psychological interventions are recommended.



Criteria for Initiation of Pharmacotherapy in Children with ADHD
Diagnostic assessment is complete and confirms diagnosis of ADHD
Child is ≥ 6 years[*]
Parents accept medication as a contribution to management
School will cooperate in administration and monitoring[¶]
No previous sensitivity to the chosen medication
Child has normal heart rate and blood pressure
Child is seizure-free[Δ]
Child does not have Tourette syndrome[Δ]
Child does not have pervasive developmental delay[Δ]
Child does not have significant anxiety
Substance use among household members is not a concern (for children who will be treated with immediate-release stimulants)[◊]

ADHD: attention-deficit/hyperactivity disorder

* Conditions in children < 6 years should be managed by or in consultation with a specialist since the effects of stimulants on preschool children are unpredictable

¶ It is not safe to permit the child or adolescent to take their own medication to school

Δ These conditions should be managed by, or in consultation with, a specialist

◊ Atomoxetine, osmotic-release methylphenidate, or the methylphenidate patch are alternatives to immediate-release stimulant preparations for children who live in households where substance use is a concern

Adapted from: Hill T, Taylor E. An auditable protocol for treating attention deficit/hyperactivity disorder. Arch

Elimination diets (C) are not recommended as part of the treatment plan because dietary factors typically do not account for the majority of cases of attention deficit hyperactivity disorder (ADHD). The mainstay of pharmacotherapy for children with ADHD who are ≥ 6 years is **methylphenidate (D)**. **Atomoxetine (A)** is a selective norepinephrine reuptake inhibitor and is an alternative to stimulate medications.

A 13-year-old boy is brought to your clinic for a follow-up visit regarding an evaluation for attention-deficit/hyperactivity disorder. The patient also has a tic disorder that his mother says brings him a lot of unwanted attention at school. He meets criteria for attention-deficit/hyperactivity disorder, and his mother is desperate for him to try a medication. The patient's family history is significant for a father who is in treatment for alcohol use disorder. Which of the following is the best medication to use in his treatment?

A. Alpha-2 adrenergic agonist
B. Amphetamine-dextroamphetamine
C. Atomoxetine
D. Methylphenidate

ANSWER: A

Attention-deficit/hyperactivity disorder (ADHD) **is diagnosed in childhood with symptoms of** hyperactivity,impulsivity**, or** inattention**. The choice of the initial medication for ADHD in children and adolescents depends upon a number of factors. In general,** stimulants **are the first-line agents for ADHD unless the patient has a** history of substance use or lives with a household member who has a history of substance use**. In patients with a** coexisting tic disorder**,** the use of an alpha-2 adrenergic agonist (e.g**.,** guanfacine or clonidine) may be warranted**. Alpha-2 adrenergic agonists are also used when children respond poorly to a trial of stimulants or atomoxetine, have unacceptable side effects, or have significant coexisting conditions.**

Atomoxetine (C) is a selective norepinephrine reuptake inhibitor that would be an appropriate medication to start in a patient with ADHD. However, an alpha-2 adrenergic agonist is a better choice for this patient, given his coexisting tic disorder. **Amphetamine-dextroamphetamine (B)** and **methylphenidate (D)** are stimulants that should be avoided in patients with a history of substance use or those with a household member who has a history of substance use.

Martin is a 10-year-old boy recently diagnosed with attention deficit hyperactivity disorder, and his parents are interested in starting a medication. Which of the following medications is most appropriate for this patient?

A. Clonidine
B. Guanfacine
C. Methylphenidate
D. Sertraline

ANSWER: C

Methylphenidate is a stimulant and is the **first-line medication for a patient newly diagnosed with ADHD**. ADHD is a childhood disorder that is characterized by hyperactivity, inattention, and impulsivity. Stimulants help to reduce hyperactivity and increase a patient's attention. They are used as first-line therapy because of their safety, efficacy, and rapid onset.

Clonidine (A) is an alpha-2 adrenergic agonist that has been found to be an effective treatment for ADHD but should be used as an adjunct or second-line therapy. Patients who fail the initial stimulant medication can be tried on a second stimulant or an alpha-2 adrenergic agonist such as clonidine. **Guanfacine (B)** is also an alpha-2 adrenergic agonist that should only be prescribed after a stimulant has initially been tried and found to be ineffective. **Sertraline (D)** is a selective serotonin reuptake inhibitor that is used to treat depression and anxiety. This class of medications has not been shown to treat the symptoms of ADHD and therefore should not be prescribed unless other co-morbidities exist.

A 7-year-old girl and her mother present to the clinic with concerns about school performance. Since kindergarten, teachers have voiced concerns about the child's attention issues. They report that she is easily distracted and has difficulty sustaining attention. She makes careless mistakes on homework and many times does not turn in assignments. Mom has also noticed similar behavior in the home setting, such as her child not seeming to listen to her. There is no personal or family history of illicit substance use. Which of the following is the best next step in management?

A. Atomoxetine
B. Essential fatty acid supplementation

C. Guanfacine
D. Methylphenidate

ANSWER: D

Attention-deficit/hyperactivity disorder (ADHD) can affect behavioral, academic, emotional, and social functioning and manifests with symptoms of inattention or hyperactivity and impulsivity. According to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders, diagnosis of ADHD must include at least six symptoms of either inattention or hyperactivity and impulsivity. The symptoms also must manifest before 12 years of age, occur often, persist at least six months, be present in more than one setting, impair function in academic or social activities, and be excessive for the developmental level of the child. Common symptoms of inattention include difficulty sustaining attention, being easily distracted by irrelevant stimuli, failure to follow through with chores or homework, avoiding tasks that require sustained mental effort, making careless mistakes, and difficulty organizing tasks and belongings. For children ≥ 6 years of age, **combined pharmacological and behavioral/psychological interventions** are recommended. The mainstay of pharmacotherapy for children with ADHD who are ≥ 6 years is a **stimulant** medication, such as **methylphenidate**. The child's weight, height, pulse, and blood pressure should be measured and monitored throughout treatment.

An alternative to stimulant medications, **atomoxetine (A)** is a selective norepinephrine reuptake inhibitor. Although it is less effective than stimulants, it may be preferred in patients with a personal or family history of illicit substance use. Although unlikely to be harmful, **essential fatty acid supplementation (B)** is not recommended as part of the treatment plan for ADHD because evidence of efficacy is lacking. Because it is less effective than the stimulant medications, **guanfacine (C)**, an alpha-2 adrenergic agonist, is utilized when a patient has failed a trial of stimulants or atomoxetine.

A 10-year-old girl is brought to your clinic by her parents for evaluation. Her parents report that over the past year, she has been getting easily annoyed and has had trouble following the rules, both at home and at school. At home, she argues with her parents frequently, does not finish her chores, and struggles to finish her homework. In school, her teachers report that she often fidgets, is disruptive, and distracts the other children. Which of the following is the most likely diagnosis?

A. Attention-deficit/hyperactivity disorder
B. Conduct disorder
C. Intermittent explosive disorder
D. Oppositional defiant disorder

ANSWER: A

Attention-deficit/hyperactivity disorder (ADHD) is the most common behavioral disorder in children, and its prevalence is increasing. Physicians should evaluate for ADHD in children with behavioral concerns such as **inattention**, **hyperactivity**, **impulsivity**, or **oppositionality**. There are three subtypes: inattentive, hyperactive-impulsive, or combined. There is no specific test to diagnose ADHD, however, review of the DSM-5 criteria and use of a validated screening tool (the Vanderbilt Assessment Scale is free and endorsed by the American Academy of Pediatrics) can help determine the diagnosis. Treatment should focus on behavioral therapies for children younger than 6 years of age, and pharmacotherapy may be warranted in children older than 6 years.

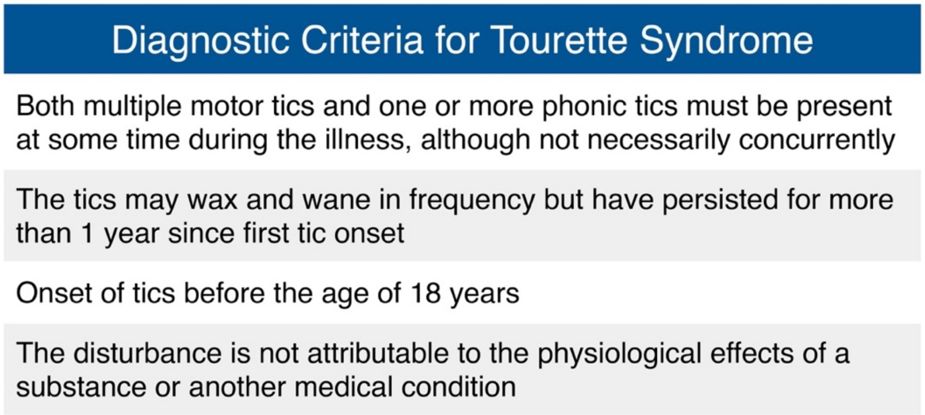
Conduct disorder (B) is associated with more severe behavioral issues such as aggression towards animals or people, destruction of property, or patterns of theft or deceit. This conduct typically results in conflict with authority. **Intermittent explosive disorder (C)** is characterized by sudden, repetitive episodes of impulsive, aggressive behavior, or angry outbursts that are out of proportion to the situation. Road rage and throwing or breaking object are examples of sudden, aggressive responses. **Oppositional defiant disorder (D)** is seen in children that often have an angry mood, defiant behavior, and are vindictive or spiteful. These behaviors tend to be directed towards more than just family members and occur outside the school and home in settings where attention or sitting quietly is not required.

Tourette's syndrome is associated with which one of the following comorbidities.

A. Attention-deficit disorder
B. Complex partial seizures
C. Hypertension
D. Hypothyroidism

ANSWER: A

Tourette's syndrome is a childhood movement disorder characterized by motor and vocal tics that must be diagnosed before 21 years of age. It is often associated with behavior disorders, particularly obsessive compulsive disorder (OCD) and attention deficit hyperactivity disorder (ADHD). These behavior disorders often accompany the tics and may dominate the clinical picture in some patients. If ADHD or OCD predominates then treatment should focus on those symptoms before prescribing medications for Tourette's syndrome.



Diagnostic Criteria for Tourette Syndrome
Both multiple motor tics and one or more phonic tics must be present at some time during the illness, although not necessarily concurrently
The tics may wax and wane in frequency but have persisted for more than 1 year since first tic onset
Onset of tics before the age of 18 years
The disturbance is not attributable to the physiological effects of a substance or another medical condition

Hypothyroidism (D) can often be associated with depression however it has no correlation to Tourett's syndrome. In **complex partial seizures (B)** the patient is unresponsive and does not remember events that occurred. Automatisms are nonpurposeful, stereotyped, and repetitive behaviors that commonly accompany complex partial seizures. **Hypertension (C)** does not have a correlation with Tourette's syndrome.

A 5-year-old boy is brought to your office with his parents with a concern for possible attention deficit hyperactivity disorder. After a diagnosis is confirmed, which of the following is the next most appropriate step in the management of this patient?

A. Behavioral therapy
B. Dextroamphetamine/amphetamine
C. Diet modification
D. Methylphenidate

ANSWER: A

The prevalence of attention deficit hyperactivity disorder has been increasing and it is the most common behavioral problem in children. The evaluation for attention deficit hyperactivity disorder should begin with a thorough history and physical examination. The physician should inquire about the patient's symptoms across home, social, and academic settings. Patients often fall into either an inattentive or hyperactive form, however, both are treated the same. Symptoms must interfere functioning in two different environments and cannot be secondary to another medical or psychological condition. There are several validated rating scales that should be used to collect data from multiple observers across different settings. Attention deficit hyperactivity disorder cannot be accurately diagnosed in children under the age of four. The goals of treatment should focus on improving function and behavior. Treatment of children under the age of six should focus on behavioral therapy. Therapy can be multifactorial and include parent training, peer interventions, classroom management, or a combination.

Medications along with behavioral therapy are recommended for patients 6 years of age and older. Psychostimulants are a safe first-line option for these patients that require more than behavioral modification. Examples of this class of medications include dextroamphetamine/amphetamine (B) and methylphenidate (D). These medications work by affecting central dopaminergic pathways to help reduce symptoms and improve academic performance. There is no clear evidence that diet modification (C) plays any role in attention deficit hyperactivity disorder symptoms. All patients should be encouraged to eat a healthy, well-balanced diet as part of their general health regardless of their symptoms.

Pretest

A 26-year-old male college graduate is seeing you for an office visit. He is concerned that he may have attention deficit hyperactivity disorder (ADHD). Which of the following is true regarding this condition?

A. The symptoms are likely to be more pronounced in adults as compared with children.
B. Children diagnosed with ADHD commonly continue to have symptoms into adulthood.
C. Sleep disturbance is a distinctive feature of adult ADHD.
D. Appetite disturbance is a distinctive feature of adult ADHD.
E. The symptom picture of adult ADHD mimics that in children.

ANSWER: B

Of children diagnosed with ADHD, 60% to 75% will continue to exhibit symptoms into adulthood. In adults, symptoms of ADHD may be more subtle, and symptoms may change. Deficits in executive function tend to be more salient (poor organization or time management) and the "hyperactivity" of childhood may be replaced by restlessness or difficulty relaxing. Patients with impulsivity as a child may replace that with difficulty monitoring behavior or modulating emotional intensity.

You are seeing a 6-year-old boy who is being evaluated for ADHD. Behavioral rating. forms completed by his teachers and his parents are consistent with the diagnosis. Which of the following blood tests should you obtain prior to making the diagnosis?

A. No blood tests are necessary.
B. CBC.
C. Sedimentation rate.

D. TSH.
E. Toxicology screen.

ANSWER: D

When screening for ADHD, a thorough history and physical should be completed, and behavioral rating forms should be reviewed. Laboratory testing should be obtained to rule out other causes of symptoms, and include blood chemistries, a TSH, and a lead level. Most children with ADHD will have normal laboratory values, but these tests can exclude other causes of symptoms.

Promotion 2021

A 7 years old patient within ability to stay in the class without interruption, getting round around the class and pick the other students (ADHD), what is the management?

A. Dextroamphetamine
B. Paroxetine
C. Guanfien

Answer: A

ADHD case, what will help in dx:

Answer: A

Symptoms at home, affecting social and function, occurs at home, more than 3 months, age more than 12 year

Promotion 2019

Child brought by his parents due to failing at school, impulsive behavior, not completing tasks. When he asked about the cause, he said “I get distracted by the noise in the class”. At the clinic he maintains good eye contact but he seems distracted. What the diagnosis?

A. Autism
B. ADHD

Answer: B

Part 2018

Mother came with her child to clinic. She states her child doesn't speak except for a few words. He likes to play with the same toys in the same way; He plays with his. Cars by counting them and arranging them. Not communicating with others except for his parents. What is the likely diagnosis?

A. Autism

Answer: A

Part 2017

Mother is concerned about her 2-year-old child, who doesn't say any word, poor eye contact, not responding to his parents when they call his name, and playing with train game for ever, Blood works normal, Hearing test normal, what is the diagnosis:

A. Autism spectrum disorder
B. Developmental "language" delay

Answer: A

Part 2016

A 4 years old boy brought by his father who complains that his son is playing alone with his toys and not interested to play with his brothers. On physical examination he is normal. What is the most likely diagnosis

A. Autism.
B. ADHD.
C. Conductive hearing loss.
D. Separation anxiety syndrome

Answer: A

A father came to you with his child c/o behavioral and speech difficulty he mentioned that the child always play alone, diagnosis is?

A. Autism

Answer: A

A 4 year old boy with history of impaired language, repetitive compulsive movement, decrease intelligence, preoccupied with inanimate games, the child has case of:

- A. autism
- B. ADHD
- C. Panic

Answer: A

A child with decrease social contact and get frustrated by noise (Autism:)?

- A. Observation behavior
- B. Metabolic testing

Answer: A

Part 2 2022

Child 5-year-old comes with symptoms of ADHD, what is the important investigation to do for him before starting the treatment?

- A. Renal US
- B. ECG
- C. TSH
- D. No blood test is necessary

Answer: C

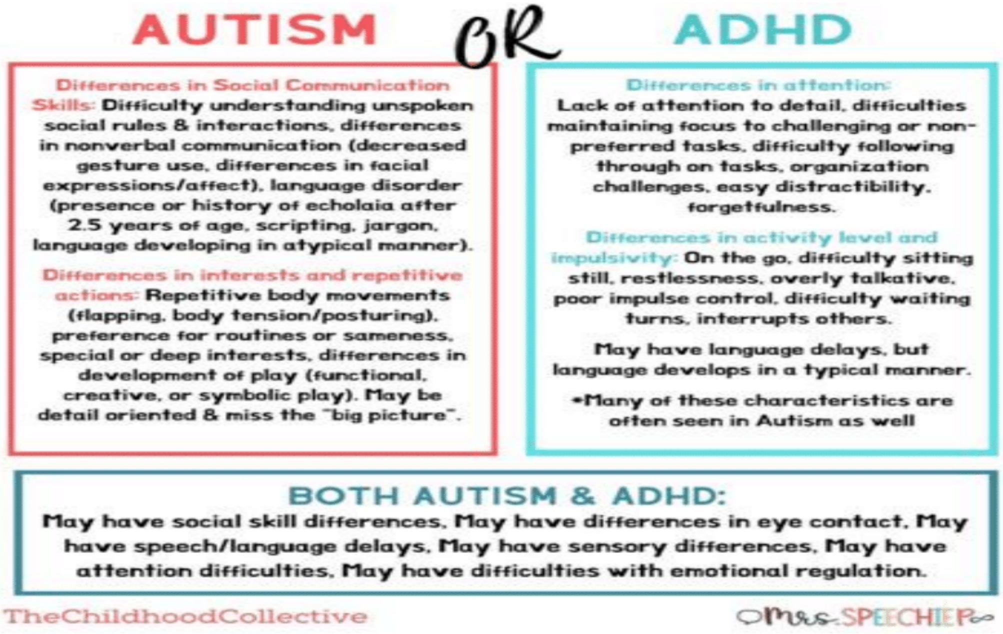
Part 1 2022 + Part 1 2021

A child presented to the clinic with his parents with repetitive talk in the clinic and other autistic behavior (The child does not play with a group of children, and play in one manner, doesn't have eye contact. What's the most appropriate management?

- A. Behavior therapy
- B. SSRI
- C. Methylphenidate

Answer: A.

Behavior therapy: the cornerstone of autism spectrum disorder (ASD) management is BEHAVIORAL therapy. ❌SSRI→ not indicated for ASD itself, unless comorbid with MDD or anxiety that requires Tx ❌Methylphenidate or other amphetamine-like meds → indicated for ADHD, not ASd



AUTISM OR ADHD

Differences in Social Communication Skills: Difficulty understanding unspoken social rules & interactions, differences in nonverbal communication (decreased gesture use, differences in facial expressions/affect), language disorder (presence or history of echolaia after 2.5 years of age, scripting, jargon, language developing in atypical manner).

Differences in interests and repetitive actions: Repetitive body movements (flapping, body tension/posturing), preference for routines or sameness, special or deep interests, differences in development of play (functional, creative, or symbolic play). May be detail oriented & miss the "big picture".

Differences in attention: Lack of attention to detail, difficulties maintaining focus to challenging or non-preferred tasks, difficulty following through on tasks, organization challenges, easy distractibility, forgetfulness.

Differences in activity level and impulsivity: On the go, difficulty sitting still, restlessness, overly talkative, poor impulse control, difficulty waiting turns, interrupts others.

May have language delays, but language develops in a typical manner.

*Many of these characteristics are often seen in Autism as well

BOTH AUTISM & ADHD:

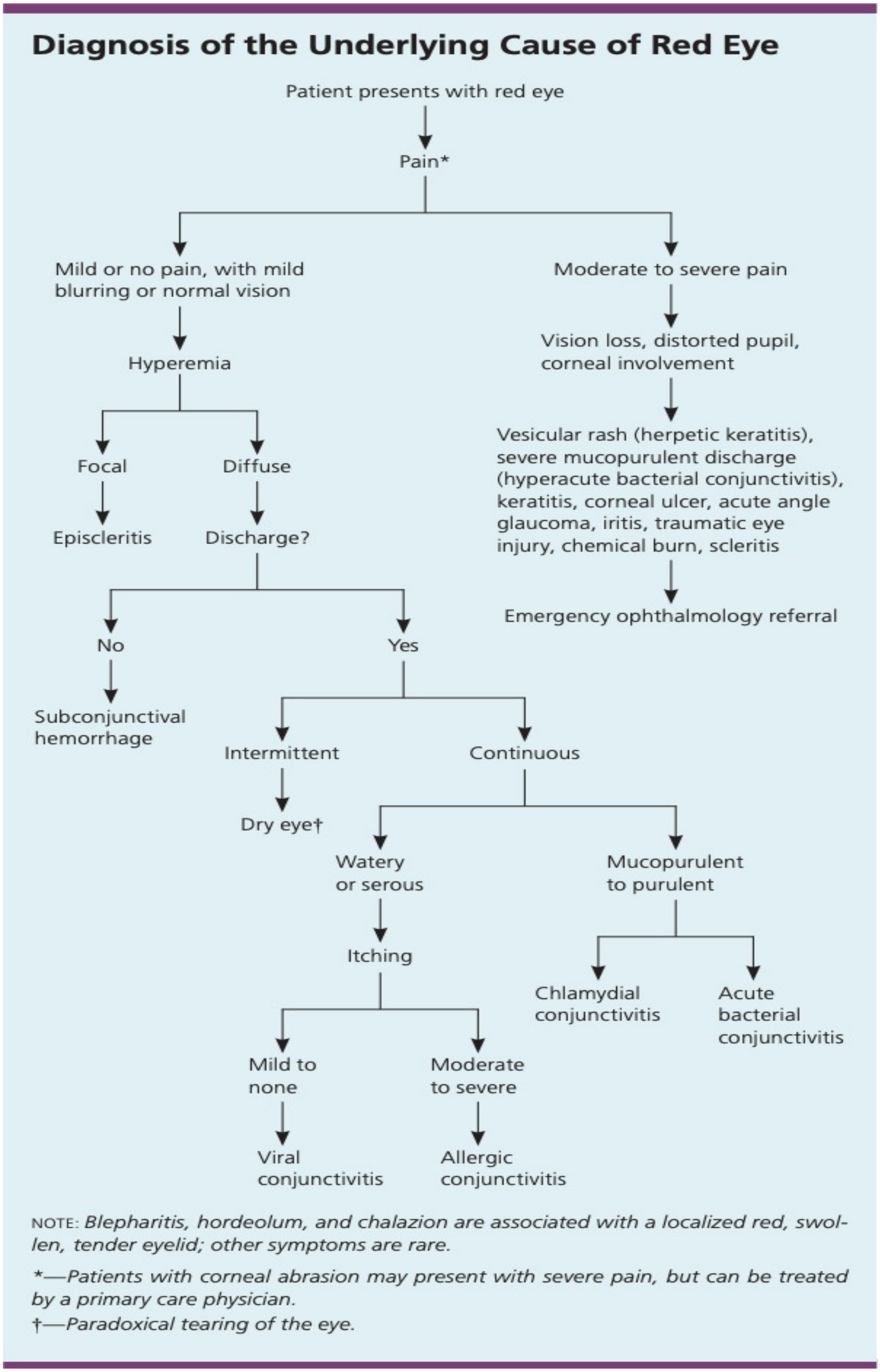
May have social skill differences, May have differences in eye contact, May have speech/language delays, May have sensory differences, May have attention difficulties, May have difficulties with emotional regulation.

TheChildhoodCollective

Mrs.SPEECHIEP

Red eye

Collected by: Ibrahim Alhoshan R2
Reviewed by: Hanan AlAbdullah R2


Diagnosis of the Underlying Cause of Red Eye
Patient presents with red eye
Pain*
Mild or no pain, with mild blurring or normal vision
Moderate to severe pain
Hyperemia
Vision loss, distorted pupil, corneal involvement
Focal
Diffuse
Vesicular rash (herpetic keratitis), severe mucopurulent discharge (hyperacute bacterial conjunctivitis), keratitis, corneal ulcer, acute angle glaucoma, iritis, traumatic eye injury, chemical burn, scleritis
Episcleritis
Discharge?
Emergency ophthalmology referral
No
Yes
Subconjunctival hemorrhage
Intermittent
Continuous
Dry eye†
Watery or serous
Mucopurulent to purulent
Itching
Chlamydial conjunctivitis
Acute bacterial conjunctivitis
Mild to none
Moderate to severe
Viral conjunctivitis
Allergic conjunctivitis

NOTE: *Blepharitis, hordeolum, and chalazion are associated with a localized red, swollen, tender eyelid; other symptoms are rare.*

*—*Patients with corneal abrasion may present with severe pain, but can be treated by a primary care physician.*

†—*Paradoxical tearing of the eye.*

Figure 1. Algorithm for diagnosing the cause of red eye.

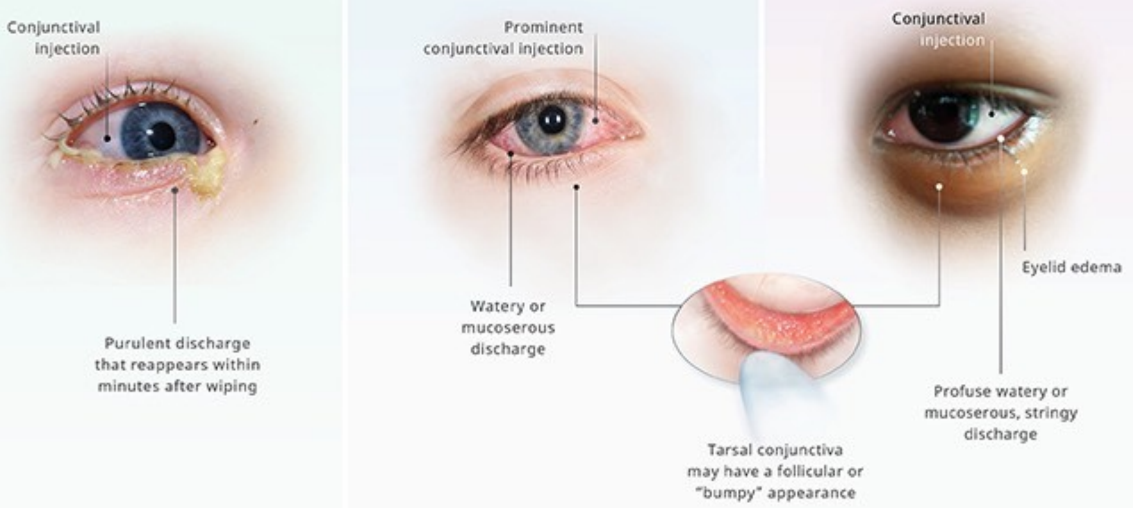
UpToDate®

Bacterial vs. Viral vs. Allergic Conjunctivitis

BACTERIAL

VIRAL

ALLERGIC


Conjunctival injection
Purulent discharge that reappears within minutes after wiping
Prominent conjunctival injection
Watery or mucoserous discharge
Tarsal conjunctiva may have a follicular or "bumpy" appearance
Conjunctival injection
Eyelid edema
Profuse watery or mucoserous, stringy discharge

Other Features - Bacterial	**Other Features** - Viral	**Other Features** - Allergic
Distribution • May be unilateral or bilateral	**Distribution** • May be unilateral or bilateral	**Distribution** • Typically bilateral
Eye Symptoms • Discharge is the most prominent symptom • Eye often "stuck shut" in morning	**Eye Symptoms** • Sensation of grittiness, burning, or irritation • Crusting on lid margin in morning	**Eye Symptoms** • Itching • Sensation of grittiness, burning, or irritation • Crusting on lid margin in morning
Other Symptoms • None	**Other Symptoms** • May be part of viral upper respiratory tract infection, with associated nasal congestion or pharyngitis	**Other Symptoms** • May have other allergic symptoms, such as nasal congestion, sneezing, cough, or wheezing

KEY CONCEPTS

Bacterial, viral, and allergic conjunctivitis are common, usually self-limited causes of "red eye" in the community setting. Although certain signs and symptoms are more common in each type of conjunctivitis, no single sign or symptom distinguishes these conditions with certainty. In addition to the eye examination, a careful history is essential for determining the most likely diagnosis.

Distinguishing bacterial, viral, and allergic conjunctivitis can avoid unnecessary or inappropriate treatment:

- **Bacterial conjunctivitis:** While most cases are self-limited, topical antibiotics may shorten symptom duration and are required for contact lens wearers.
- **Viral conjunctivitis:** Topical antihistamines and/or topical decongestants and warm or cool compresses may provide symptomatic relief.
- **Allergic conjunctivitis:** Treatment includes minimizing exposure to the allergen, use of topical lubricants and cool compresses for comfort, and use of topical or systemic antihistamines.

A "red eye" can be caused by other disorders. Examples of findings that support urgent ophthalmologic referral include loss of visual acuity, photophobia, and ciliary flush.

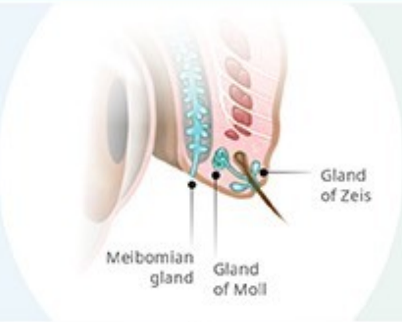
Bacterial and viral conjunctivitis images ©Dr P. Marazzi/Science Photo Library

UpToDate®

Hordeolum (Stye) vs. **Chalazion**

HORDEOLUM

Acute inflammation of the glands of Moll or Zeis *(external hordeolum)* or the meibomian glands *(internal hordeolum)*

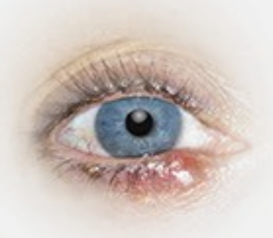


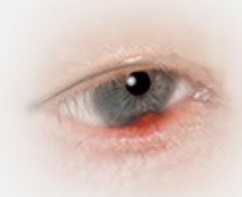
CHALAZION

Sterile lipogranuloma caused by obstruction of a meibomian gland

External hordeolum

Swollen, tender, erythematous, and/or purulent nodule near the lid margin



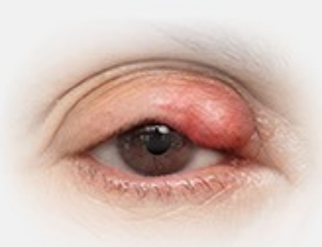


Internal hordeolum

Eyelid swelling and erythema with purulent nodule on conjunctival surface

OTHER FEATURES: Hordeolum

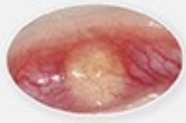
- **Site:** Upper or lower eyelid
- **Risk factors:** Rosacea, seborrheic dermatitis, use of eye make-up
- **Complications:** Preseptal cellulitis or progression to chalazion



Chalazion

Painless, firm, dome-shaped nodule

Conjunctival view



OTHER FEATURES: Chalazion

- **Site:** Upper or lower eyelid *(upper eyelid more common)*
- **Risk factors:** Rosacea, posterior blepharitis
- **Complications:** Eyelash loss, lid notching, visual changes *(secondary to compression from large chalazia)*

KEY CONCEPTS

Hordeolum and chalazion are common disorders that present as nodular lesions on the eyelid. Conservative management with warm compresses (5 to 10 minutes at least twice daily) is generally sufficient for both lesions. Referral to ophthalmology for additional therapeutic options is appropriate for hordeola and chalazia that do not resolve with conservative treatment.

- **Hordeola generally improve within 1 to 2 weeks.** Although bacteria, such as *Staphylococcus aureus*, contribute to the development of some hordeola, antibiotic therapy is not indicated. Infrequently, hordeola present in association with preseptal cellulitis, necessitating antibiotic therapy.
- **Chalazia typically improve over several months.** Referral to ophthalmology for intralesional corticosteroid injections or surgical removal is an option for chalazia that do not spontaneously resolve within a tolerable time period. Ophthalmology referral to rule out sebaceous carcinoma is also appropriate for chalazia that persist for more than 2 to 3 months and for chalazia that recur after removal.

Internal hordeolum image: Original photograph used with permission. Copyright © 2022 DermNet NZ. www.dermnetnz.org.

Table 1. Selected Differential Diagnosis of Eye Pain: Key Features and Management Options

Diagnosis	*Key features*	*Management options*
Conjunctiva		
Bacterial conjunctivitis	Erythema of the bulbar conjunctiva, purulent discharge with bilateral matting of eyelids, no itching; *Neisseria gonorrhoeae* infection has a hyperacute presentation with copious discharge, eye pain, and decreased vision	All broad-spectrum antibiotic eye drops are effective Culture should be performed only in severe cases, if the patient wears contact lenses, or if initial treatment is ineffective
Viral conjunctivitis	Erythema of the palpebral or bulbar conjunctiva, serous discharge with mild to no itching; adenovirus infection accounts for up to 62% of cases	Supportive care with cold compresses, ocular antihistamines, and artificial tears
Sclera		
Scleritis	Severe, boring eye pain that is worse with eye movement and radiates or causes headache; red eye with thin, bluish sclera on examination; decreased visual acuity	Nonsteroidal anti-inflammatory drugs: ibuprofen, 400 to 600 mg three times per day; naproxen, 250 to 500 mg twice per day; or indomethacin, 25 mg twice per day
	50% of cases are associated with rheumatologic disease	Ophthalmology referral
Cornea		
Bacterial keratitis	Red eye, discharge, photophobia, decreased visual acuity	Non–contact lens users: broad-spectrum antibiotic eye drops
	Most common in contact lens users	Contact lens users: discontinuation of contact lens use; topical fluoroquinolones or aminoglycoside drops
	Pathogens include *Pseudomonas, Staphylococcus aureus,* and *Serratia*; yellow-green discharge suggests *Pseudomonas*	Ophthalmology referral for slit lamp evaluation, consideration of corneal culture, close follow-up
Corneal abrasion	Fluorescein stain is usually linear if from trauma or foreign body, and round if from contact lens use	Topical nonsteroidal anti-inflammatory drops Addition of topical fluoroquinolones or aminoglycoside drops in contact lens users to prevent bacterial superinfection Eye patches are not recommended and may be harmful
Dry eye syndrome	Burning, dryness, foreign body sensation, excess tearing; typically bilateral and chronic	Artificial tears four times per day for initial treatment; ophthalmology referral if refractory or severe
Parasitic keratitis	*Acanthamoeba* is most common; risk factors are poor contact lens hygiene and wearing contact lenses while swimming, using a hot tub, or showering	Bacterial culture results are negative; condition often misdiagnosed; diagnosis should be considered when antibiotics or antivirals are ineffective
	Symptoms are extreme eye pain, redness, and photophobia over weeks; ring-like infiltrate on corneal stroma	If suspected: oral nonsteroidal anti-inflammatory drugs, discontinuation of contact lens use, ophthalmology referral Scrapings from the eye for culture and additional staining, and direct microscopy aid in the diagnosis
Superficial punctate keratitis	Inflammation of the corneal epithelium; punctate/pinpoint fluorescein stain, hazy cornea	Contact lens users: discontinuation of contact lens use; artificial tears, plus topical antibiotics in severe cases
	Causes include contact lens use, intense ultraviolet light exposure, dry eye syndrome, and exposure keratopathy	Ultraviolet light keratopathy: cycloplegic eye drops, antibiotic ointment, oral analgesics Exposure keratopathy: artificial tears, lubricating ointments Dry eye syndrome: see above
Viral keratitis	Herpes simplex virus infection: red eye, blepharitis, decreased visual acuity, photophobia, vesicular rash (eyelid), dendritic fluorescein stain, possible corneal ulcer	Herpes simplex virus infection: ganciclovir 0.15% ophthalmic gel (Zirgan) or trifluridine 1% drops (Viroptic); ophthalmology referral
	Herpes zoster ophthalmicus: similar to herpes simplex virus infection but may have a vesicular rash in V_1 dermatome and the typical zoster prodrome	Herpes zoster ophthalmicus: oral acyclovir, 800 mg five times per day, or valacyclovir (Valtrex), 1,000 mg three times per day; ophthalmology referral

Table 1. Selected Differential Diagnosis of Eye Pain: Key Features and Management Options

Diagnosis	*Key features*	*Management options*
Anterior chambers		
Acute angle-closure glaucoma	Shallow anterior chamber with elevated intraocular pressure; ciliary flush sign; associated with headache, nausea, vomiting, and abdominal pain; hazy/steamy cornea or fixed mydriasis	Emergent ophthalmology referral Typically, a combination of medications are used to lower intraocular pressure by decreasing aqueous humor production: topical beta blocker or alpha-2 agonist, systemic carbonic anhydrase inhibitor Intraocular pressures rechecked every 30 to 60 minutes following initiation of medications
Uvea		
Anterior uveitis	Photophobia, miosis, ciliary flush sign, inflammatory white blood cells and flare in anterior chamber Often associated with systemic diseases, including seronegative spondyloarthropathies, sarcoidosis, syphilis, rheumatoid arthritis, and reactive arthritis	Emergent ophthalmology referral Topical steroid or immunosuppressant initially to decrease ocular inflammation, ophthalmology referral Limited work-up for bilateral or recurrent episodes without systemic symptoms: rapid plasma reagin testing, chest radiography, erythrocyte sedimentation rate, and human leukocyte antigen B27 testing
Other		
Cluster headache	Unilateral, stabbing, periorbital, frontal or temporal headache; constricted pupil and/or ptosis; tearing; ipsilateral conjunctival injection; rhinorrhea; proptosis; facial sweating Usually lasts minutes to hours with recurrence	First-line treatment for acute cluster headache: sumatriptan (Imitrex) or zolmitriptan (Zomig) plus oxygen, 12 to 15 L per minute for 15 minutes, administered through a nonrebreather face mask
Optic neuritis	Orbital pain with eye movement, relative afferent pupillary defect, decreased color vision, acute vision loss occurring over days Associated with multiple sclerosis and systemic disease	Acute demyelinating optic neuritis: neurology and ophthalmology referral with hospital admission, high-dose corticosteroids Diagnosis is typically clinical, although it can be made earlier with magnetic resonance imaging
Orbital cellulitis	Extraocular motility restriction, orbital pain with eye movement, eyelid swelling and ptosis; associated paranasal sinusitis	Ophthalmology referral with hospital admission; intravenous vancomycin plus ceftriaxone, cefotaxime (Claforan), ampicillin/sulbactam (Unasyn), or piperacillin/tazobactam (Zosyn)

Information from references 3 through 20.

Table 2. History and Physical Examination Findings Suggestive of Different Causes of Eye Pain

Finding	*Possible causes*
History	
Contact lens use	Corneal abrasion, keratitis, bacterial conjunctivitis
Decreased vision	Optic neuritis, scleritis, keratitis, uveitis, acute angle-closure glaucoma, cellulitis
Foreign body sensation	Corneal abrasion, dry eye syndrome, keratitis, retained foreign body
Headache	Acute angle-closure glaucoma, scleritis, cluster headache, migraine
Photophobia	Keratitis, uveitis, corneal abrasion, migraine, acute angle-closure glaucoma
Stabbing or boring eye pain	Scleritis, cluster headache
Systemic inflammatory or autoimmune disease	Scleritis, uveitis, optic neuritis
Physical examination	
Conjunctival injection	Conjunctivitis, uveitis, scleritis, keratitis, corneal abrasion, cluster headache, acute angle-closure glaucoma
Eyelid swelling	Hordeolum, orbital cellulitis, preseptal cellulitis
Increased intraocular pressure	Acute angle-closure glaucoma
Pain with extraocular movement	Optic neuritis, orbital cellulitis, scleritis, acute angle-closure glaucoma
Positive penlight test	Uveitis, keratitis
Positive swinging flashlight test	Optic neuritis
Uptake of fluorescein stain	Corneal abrasion, keratitis

Information from reference 11.

Assessment of the red eye

	Acuity	Foreign-body sensation	Photophobia	Discharge	Cardinal feature	Treat/refer
Lids/lashes						
Stye/hordeoleum	Normal	-	-	None	Tender	Treat
Chalazion	Normal	-	-	None	Nontender	Treat
Blepharitis	Normal	-	-	Dry crusting	Chronic	Treat
Conjunctiva						
Conjunctivitis						
Bacterial	Normal	-	-	Mucopurulent	Discharge all day	Treat
Viral	Normal	-	-	Mucoserous	None/URI	Treat
Allergic	Normal	-	-	Mucoserous	Itching	Treat
Nonspecific (toxic or dry eye syndrome)	Normal	-	-	Watery		
Episcleritis	Normal	-	-	None	Sectoral injection, dull ache	Treat
Subconjunctival hemorrhage	Normal	-	-	None	Extravasated blood	Treat
Cornea						
Abrasion	Normal or decreased	+	+	Watery	History/trauma defect revealed by fluorescein	Treat
Contact lens overwear	Normal or decreased	+	+	Watery	History	Treat
Foreign body	Normal or decreased	+	+	Mucoserous	History/trauma	Treat initially by attempt to remove by irrigation or swab; refer if still present after 24 hours
Infectious keratitis						
Bacterial	Normal or decreased	+	+	Muco-purulent	White spot on cornea spots stains with fluorescein	Emergency referral (same day)
Viral	Normal or decreased	+	+	Watery	Gray, branching opacity dendrite; dendrite revealed with fluorescein	Urgent referral (1 to 2 days)
Anterior chamber/iris						
Iritis	Normal or decreased	-	+	None/watery	Ciliary flush, very small pupil	Urgent referral (1 to 2 days)
Hyphema	Normal or decreased	-	+/-	None/watery	RBC "level"	Emergency referral (same day)
Hypopyon	Normal or decreased	-	+/-	None/purulent	WBC "level"	Emergency referral (same day)
Iris/lens						
Angle closure	Normal or decreased	-	+/-	None/watery	Fixed, mid-dilated pupil	Emergency referral (same day)

URI: upper respiratory infection; RBC: red blood cell; WBC: white blood cell.

- Most common organism cause conjunctivitis in lens contact user is: pseudomonas aeruginosa, treated by fluoroquinolone like ofloxacin eye drops.

- In corneal abrasion recommendation **against to patch**: because it delay healing by decrease the oxygen reach to the cornea.

- Good hygiene, such as meticulous hand washing, is important in decreasing the spread of acute viral conjunctivitis.

- Any ophthalmic antibiotic may be considered for the treatment of acute bacterial conjunctivitis because they have similar cure rates.

- Mild allergic conjunctivitis may be treated with an over-the-counter antihistamine/vasoconstrictor agent, or with a more effective second-generation topical histamine H1 receptor antagonist.

- Anti-inflammatory agents (e.g., topical cyclosporine [Restasis]), topical corticosteroids, and systemic omega-3 fatty acids are appropriate therapies for **moderate** dry eye.

- Patients with chronic blepharitis who do not respond adequately to eyelid hygiene and topical antibiotics may benefit from an oral tetracycline or doxycycline.

- Chalazion is a **painless**, treatment is conservative by warm pads apply 3 to 4 time per day, stye is a **painful** and treated with warm pads and antibiotic ointment.

- Referral is necessary in severe pain, vision loss, corneal involvement, traumatic eye injury, recent ocular surgery, distorted pupil, herpes infection, or recurrent infections.

Please read full article from this link AAFP
https://www.aafp.org/afp/2016/0615/p991.html
https://www.aafp.org/afp/2010/0115/p137.html

Red eye
MCQs

ABFM 2022

A patient sees you because of eye pain and swelling that have been present for a few days. A physical examination reveals a small, pink, tender area of the upper eyelid with an adjacent, slightly inflamed gland opening at the eyelid margin.
Which one of the following would be the most appropriate initial treatment?

A. Warm compresses and gentle massage of the eyelid
B. Topical moxifloxacin ophthalmic solution 0.5% (Vigamox)
C. Topical tobramycin/dexamethasone ophthalmic solution 0.3%/0.1% (Tobradex)
D. Oral cephalexin (Keflex)
E. Incision and drainage

Answer : A
This patient has a hordeolum (stye). Typical first-line treatment is to apply warm compresses and perform gentle massage of the area to promote drainage of the occluded gland. Antibiotics and incision and drainage are not necessary unless surrounding cellulitis is present or there is failure to improve with initialtherapy.

A 69-year-old male with a history of diabetes mellitus presents to your clinic with concerns of mild vision problems. His brother lost his vision due to glaucoma and encouraged the patient to seek care.
Which one of the following is most consistent with the typical vision changes of glaucoma?

A. Central vision loss with peripheral sparing
B. Halos and decreased night vision
C. Intermittent complete blackening of the visual field
D. Patchy peripheral vision blurring
E. Sudden scattered floaters

ANSWER: D
Glaucoma and other common eye conditions cause a range of visual disturbances. Glaucoma is typically associated with blurring of peripheral vision as elevated pressure in the eye pushes on the periphery of the ophthalmic nerve. Central vision loss with peripheral sparing is classically seen with macular degeneration. Halos and decreased night vision are classic problems for patients with cataracts. Intermittent complete blackening of the visual field may be seen with ischemia associated with stroke or temporal arteritis.
Sudden scattered floaters should raise concern for retinal detachment.

A 30-year-old male presents to your office after sustaining a scratch to the eye while playing with his 2- year-old nephew. A penlight examination reveals sensitivity to light and mild conjunctival irritation with noforeign body. Pupillary response, extraocular movements, and visual acuity are all normal. Fluorescein staining reveals a 3-mm corneal abrasion.

Which one of the following would be the most appropriate management?

A. Patching the affected eye
B. Patching the unaffected eye
C. Prednisolone ophthalmic drops
D. Tetracaine ophthalmic drops
E. Oral naproxen

Answer :E

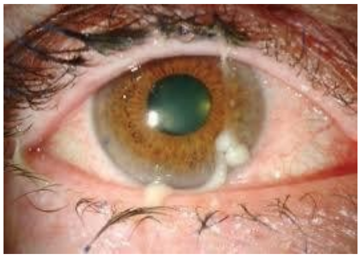
Corneal abrasions are a common cause of acute eye pain and are often evaluated in primary care settings. Small (>4 mm), uncomplicated abrasions typically heal within 1–2 days and usually respond to oral analgesics such as acetaminophen or NSAIDs. A 2013 review reported effective pain relief and earlier return to work with use of topical NSAIDs, although a 2017 Cochrane review subsequently found that evidence may be lacking to support their use, especially considering the higher cost when compared to oral options.

Patching has been proven ineffective for pain relief and can delay healing, although ophthalmologists sometimes use patching to treat large abrasions or to provide a protective barrier for patients who may have difficulty avoiding rubbing their eyes, such as children or people with cognitive impairment. Patchingof the unaffected eye is done to treat amblyopia but is not appropriate for managing corneal abrasions.

Topical corticosteroids such as prednisolone are not appropriate for treatment of corneal abrasions due to increased susceptibility to infection and the risk of delayed healing and should only be used under the guidance of an ophthalmologist. While point-of-care use of topical anesthetics such as tetracaine may be considered, repeated administration is not recommended as continued use may cause damage to the corneal epithelium, delay healing, and mask symptoms. While topical antibiotics are often prescribed in the setting of corneal abrasion to prevent bacterial superinfection, evidence to support this practice in general is lacking. However, contact lens wearers are at increased risk of infection due to Pseudomonas aeruginosa and should be prescribed an antibiotic with antipseudomonal activity.

PART 1 2022

Patient with red eyes was stuck and can't open them after waking up (picture attached), what is thetreatment?



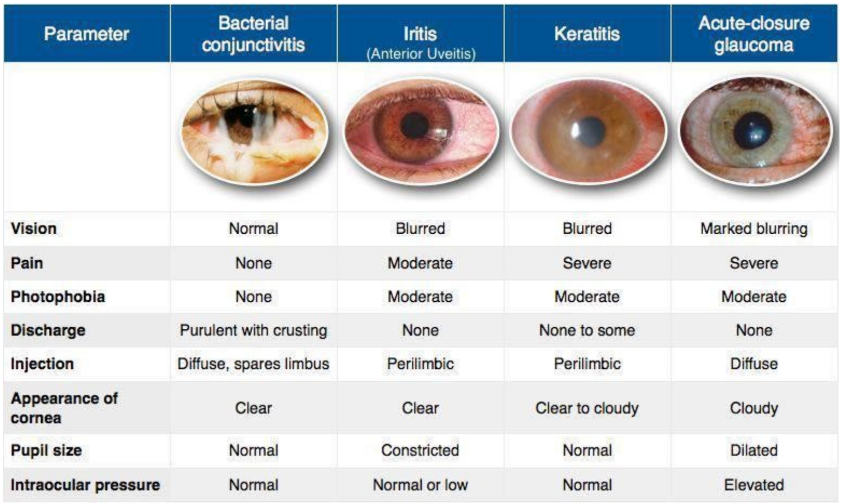
A. topical chloramphenicol
B. Topical antihistamine
C. sodium comedogenic
D. Topical NSAID

Answer: A.
topical chloramphenicol (Abx), (confirmed by all residents who got 100% in ophtha) + NICEguideline.)
Dx: Bacterial Conjunctivitis (purulent DISCHARGE) → topical Abx (Choose chloramphenicol only in exam, not in real life, it is very old Abx!)

30-year-old male, came with 2-days hx of photophobia, blurry vision of the left eye. Eye examination showed Tearing form left eye and unequal pupil reactivity. Patient is using topical retinoids, moisturizing and steroid to treat chronic psoriasis, which of the following is the most likely diagnosis?

A. Trachoma
B. Anterior uveitis
C. Chronic glaucoma
D. papilledema

Answer: B
Explanation: history of autoimmune disease (Psoriasis) + iritis sx (photophobia, blurred vision)
❌ Trachoma → neonate to mother untreated from Trachoma vaginalis or DISCHARGE or signs of papillary hyperplasia (Follicular conjunctivitis)
❌ Papilledema → HTN emergency
❌ Chronic glaucoma → CHRONIC peripheral vision loss (Tunnel vision)



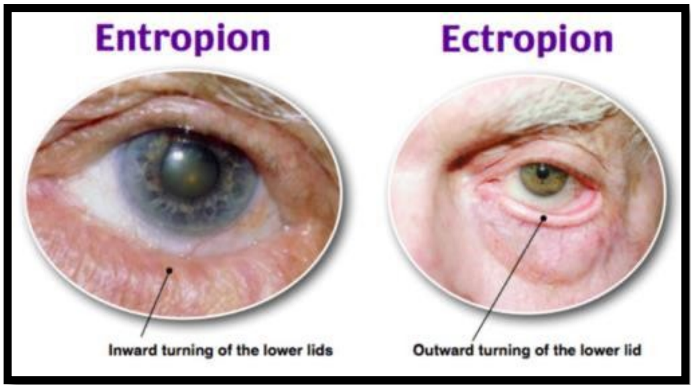
Parameter	Bacterial conjunctivitis	Iritis (Anterior Uveitis)	Keratitis	Acute-closure glaucoma
Vision	Normal	Blurred	Blurred	Marked blurring
Pain	None	Moderate	Severe	Severe
Photophobia	None	Moderate	Moderate	Moderate
Discharge	Purulent with crusting	None	None to some	None
Injection	Diffuse, spares limbus	Perilimbic	Perilimbic	Diffuse
Appearance of cornea	Clear	Clear	Clear to cloudy	Cloudy
Pupil size	Normal	Constricted	Normal	Dilated
Intraocular pressure	Normal	Normal or low	Normal	Elevated

Patient Complaining of red eye with tearing and itching, (picture attached), what is the diagnosis?

A. Entropion
B. Ectropion
C. Plepharitis

Answer: A.

Entropion: eyelid is rolled inward


Entropion
Ectropion
Inward turning of the lower lids
Outward turning of the lower lid

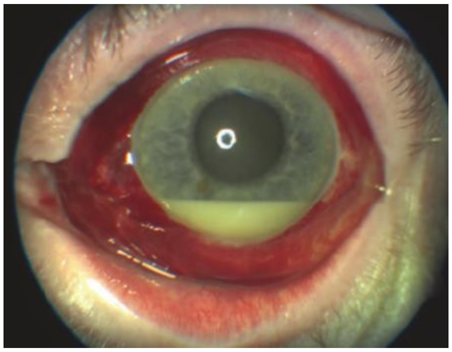
PART 2 2022

Patient with unilateral red painful eye with loss of vision and fixed mid-dilated pupil next appropriate step?

A. MRI
B. ESR
C. Tonometer

Answer: C

Old patient with eye trauma, what is the diagnosis?



A. Hyphemia
B. Hypopyon
C. Acute glaucoma
D. Keratitis

Answer: B

Child was hitting by football when he was playing and injured his eye, it was watery and itchy. Onexamination, small erosion on his eye was seen, what you will do next?

A. Irrigation
B. Fluorescein stain
C. Local antibiotic and discharge home
D. Cover the eye and follow up after 3 days

Answer: B

Child presented with eyelid swelling and redness, restricted eye movement?

A. Urgent Referral to Ophthalmology
B. Reassurance
C. Patch the eye for 3 days

Answer: A

Patient comes to clinic had dendritic ulcer in the eye, what to give?

A. Acyclovir eye drop
B. Oral steroid
C. Topical chloramphenicol
D. Topical NSAIDs

Answer: A

A 21-year old woman presents to your office with itchy and watery eyes. Her symptoms started 2 days ago with redness of both eyes, lacrimation and itching. She wears contact lenses. O/E her upper and lower lids are erythematous bilaterally. Which one of the following if in history is most consistent with the diagnosis?

A. Reduced visual acuity

B. Mucopurulent discharge
C. A lump in the upper eyelid
D. Using a new preserving solution for her contact lenses

Answer: D

A 38 years old female who is known case of UC diagnosed 8 years ago and was started on Mesalamine but admits to missing a couple of doses, comes with red eye, no pain no photophobia. She also reported some recent episodes of bloody diarrhea. Also, she recently stopped smoking. What is the diagnosis?

A. Uveitis
B. Episcleritis
C. Nicotine withdrawal and insomnia

Answer: A

PROMOTION 2022

Patient came with bilateral red eye and itching prior he was having URTI symptoms eye redness affect right eye then the left, physical exam showed normal vision red eye and watery discharge. What is the most likely diagnosis?

A. Viral conjunctivitis
B. Allergic conjunctivitis
C. Bactral conjectivtis
D. Keratitis

*Answer: A

Chemical exposure to eye decrease vision , eye pain and photophobia next step ?

A. NSAID
B. Irrigation with slain

*Answer: B

A 63-year-old woman presents to the clinic with an abrupt onset of visual changes in her right eye earlier this morning. She describes flashes of light and an increase in the number of floaters in her right eye. Visualfield testing demonstrates decreased peripheral vision in her right eye. Physical examination demonstratespupils that are equal, round, and reactive to light, intact extraocular movements, and clear conjunctivae bilaterally. Which of the following is the most likely diagnosis?

A. Age-related macular degeneration
B. Amaurosis fugax
C. Ocular migraine
D. Retinal Detachment

Answer D

The retina is a multilayer of neurons lining the posterior eye. **Retinal detachment** occurs when this layer separates from the underlying retinal pigment epithelium and choroid. This results in ischemia and a rapidly progressive photoreceptor degeneration. Retinal detachment can occur due to a break in the retina(i.e., age-related vitreous detachment tearing the retina), due to vitreous contraction in patients with diabetic or sickle cell retinopathy, or due to accumulation of fluid beneath the retina as a result of inflammation or malignancy. Without intervention, the majority of symptomatic retinal detachments advance to involve the entire retina causing **permanent visual loss**. Therefore, early diagnosis and treatment are crucial to limit loss of vision. Hallmark clinical symptoms include an **increasing number of floaters in one eye**, **photopsia** (flashes of light), and a **peripheral visual field defect**. Such patients
require **emergent referral to an ophthalmologist** as they may require procedures such as laser photocoagulation, cryoretinopexy, vitrectomy, or scleral buckle.

A 64-year-old man presents to your office with a chief complaint of headache and right eye pain. The pain began yesterday afternoon suddenly and has not improved. He reports a decrease in his vision and pain with extraocular eye movements. Physical examination reveals a mid-dilated pupil but no lid edema or erythema, no conjunctival injection, no scleral discoloration, and no corneal opacities or abrasions. Based on the patient’s history and physical examination findings, which of the following is the most likely diagnosis?

A. Acute angle-closure glaucoma
B. Anterior uveitis
C. Bacterial conjunctivitis
D. Scleritis

Answer: A

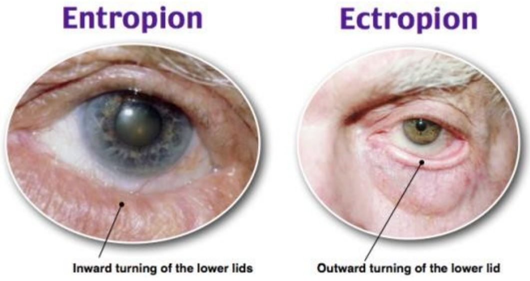
Which of the following is characterized by an outward turning of the eyelid margin?

A. A Dermatochalasis
B. Ectropion
C. Entropion
D. Trichiasis

Answer: B

Ectropion is defined as an **outward turning of the eyelid margin**. It is most commonly caused by chronic eyelid inflammation (e.g., blepharitis). Ectropion may cause ocular irritation, redness, and tearing. It mostcommonly affects the lower eyelid. The mainstay of treatment is **lubricating drops and ointment**.

Refractory cases may require surgery. Massage of the lower lid with a mild steroid cream may be beneficial in cases where the skin of the lower lid is pulled inferiorly in a cicatricial manner.


Entropion
Ectropion
Inward turning of the lower lids
Outward turning of the lower lid

ABFM 2021

An 84-year-old female presents with dryness and irritation in her eyes. Her optometrist recently diagnosed her with dry eye. Which one of the medications in this patient's current regimen is most likely causing her dry eye?

A. Amitriptyline.
B. Empagliflozin (Jardiance).
C. Levothyroxine (Synthroid).
D. Liraglutide (Victoza).
E. Metformin (Glucophage).

Answer: A.

Many systemic drugs have been reported to trigger dry eye, including diuretic agents, B-blockers, other antihypertensive agents such as candesartan, antihistamines, decongestants, medications for Parkinson's disease, antidepressant agents such as amitriptyline, anxiolytic agents, antispasmodic agents, anticonvulsant agents, gastric protection agents, oral contraceptives, and some herbal supplements. Empagliflozin, levothyroxine, liraglutide, and metformin are not associated with dry eye.

Part 2021

Patient with night blindness mainly when he drives at night, her aunt has blindness also. What is the diagnosis?

A. Retinitis pigmentosa.
B. Glaucoma.

Answer: A.

Retinitis pigmentosa is a group of hereditary disorders characterized by progressive loss of photoreceptor and retinal pigment epithelium function. It has a wide range of inheritance patterns and is characterized by diffuse, bilateral retinal dystrophic changes. Black clumps of irregular pigment in the retinal periphery lead to a “bone spicules” pattern.

A 40-year-old woman presents to your office with a painful right eye. She reports a gritty, burning sensation in her eye. On exam there is crusting and erythema of the superior lid margin. There are no masses appreciated on either lid. Which of the following is the most likely diagnosis?

A. Blepharitis.
B. Cataract.
C. Chalazion.
D. Hordeolum.

Answer: A.

A 1-month-old baby with present with his parents with white discharge from one of his eyes for the last 2 weeks, normal conjunctiva and no fever. Which one of the following would be the most appropriate management?

A. Lacrimal duct massage.
B. Antibiotic.
C. Eye swab.
D. Refer to ophthalmology.

Answer: A.

The majority of infants with NLDO spontaneously improve during the first several months of life. Therefore, most primary care physicians appropriately treat these patients initially with conservative measures. If infants have only mild symptoms, there may be no need for treatment. If significant epiphora or discharge is present, digital massage of the lacrimal sac is commonly recommended. The goal of massage is to force fluid through the distal NLD and cause the obstruction to open. If massage is used, it is important to demonstrate proper technique, which requires direct digital pressure over the lacrimal sac.

A patient hit on face by football complaining of FB sensation. Florescence was normal. Which one of the following would be the most appropriate management?

A. Cycloplegics.
B. Antibiotics.
C. Patch.
D. Topical NSAID.

Answer: D.

Although eye patches, topical antibiotics, and mydriatic agents traditionally have been used in patients with corneal abrasions, treatment recommendations recently have evolved. Current recommendations stress the use of topical or oral analgesics and topical antibiotics. Eye patching is no longer recommended for corneal abrasions. Also, Mydriatics are no longer recommended for the treatment of pain in patients with corneal abrasions. TOPICAL ANTIBIOTICS, because a concomitant infection can cause slower healing of corneal abrasions, some clinicians use prophylactic antibiotic treatment, although there is no strong evidence for this use.

A 66-year-old man with no past medical problems presents to the emergency department with sudden painin his left eye and blurring of vision that started while he was watching a movie. He has vomited twice. He has 20/40 vision in the right eye and 20/400 vision in the left eye and injection of the conjunctiva. Which one of the following diagnosis is most likely?

A. Acute Retinal Detachment.
B. Acute Angle Closure Glaucoma.
C. Acute Uveitis.
D. Acute Scleritis.

Answer: B.

Acute angle closure is an urgent but uncommon dramatic symptomatic event with blurring of vision, painful red eye, headache, nausea, and vomiting. Diagnosis is made by noting high intraocular pressure (IOP), corneal edema, shallow anterior chamber, and a closed angle on gonioscopy. Medical or surgical therapy is directed at widening the angle and preventing further angle closure. If glaucoma has developed, it is treated with therapies to lower IOP. C - D usually chronic not sudden, regarding A: there is no symptoms suggest it like floaters. So, with sign and symptoms provided like vomiting and sudden onset the right answer is B.

A patient develops acute eye pain and photophobia after mild trauma to the right eye. Examination of the eye is grossly normal except for photophobia and tearing. What is the most likely diagnosis?

A. Conjunctivitis.
B. Corneal abrasion.
C. Episcleritis.
D. Conjunctival abrasion.

Answer: B.
The key in the question here is the history of the trauma and the symptoms (Photophobia which is a Common symptom of corneal abrasion as well as tearing -part of the eye's protective reflex).

A 36-year-old female presents to your office with a 24-hour history of redness in her right eye. It is associated with mild pain but no drainage. On examination her visual acuity is 20/20 bilaterally, her pupillary reflex is normal, extraocular movements are intact, and there is no discharge noted. There is a focal area of hyperemia of the episcleral blood vessels noted along the medial aspect of the eye. Fluorescein staining is normal. This patient's presentation is most consistent with which one of the following?

A. Episcleritis.
B. Iritis.
C. Bacterial conjunctivitis.
D. Viral conjunctivitis.

Answer: A.
An acute red eye is a common presentation in primary care and it is critical to differentiate serious causes from benign causes. Episcleritis is a self-limited condition that can be idiopathic and presents with mild discomfort and focal hyperemia. Conjunctivitis is typically associated with a discharge that is clear in viral cases and mucopurulent in bacterial cases. Iritis is associated with significant pain, a poorly reactive pupil, diminished vision, and photophobia. This patient does not have changes in visual acuity, photophobia, or severe pain as seen in keratitis, which would also cause an abnormal fluorescein stain showing corneal ulceration.

A 62-year-old Asian female presents to your office with pain and redness in her left eye that started last night. She does not wear contact lenses. The pain has become more severe and she now has a headache, light sensitivity, and mild nausea. Examination of the eyes reveals diffuse conjunctival injection on the left. Her pupils are 4 mm bilaterally but the left one reacts poorly to light. Her visual acuity is 20/30 on the right and 20/100 on the left. Which one of the following would be most appropriate at this time?

A. An erythrocyte sedimentation rate and C-reactive protein level.
B. Prednisolone ophthalmic drops.

C. Emergent evaluation by an ophthalmologist.
D. Polymyxin B/trimethoprim ophthalmic drops.

Answer: C.

This patient has symptoms and examination findings that are concerning for acute angle- closure glaucoma. Her risk factors include her age, sex, and Asian ancestry. The examination findings include conjunctival redness, corneal edema, a poorly reactive mid-dilated pupil, decreased vision, severe eye pain, headache, and nausea. This condition needs to be evaluated and treated emergently to preserve vision. The examination is not consistent with infectious conjunctivitis, which generally does not cause severe pain, headache, or decreased pupillary response. Conditions such as scleritis or episcleritis may present with similar features, but the pupillary response may help differentiate them from glaucoma. Referral to an ophthalmologist would still be most prudent. This patient's presentation is not consistent with a vasculitis or multiple sclerosis.

A 22-year-old male coming complaining of right red eye. He noticed this red eye few days back which is associated with visual loss and pain. He has not been diagnosed with any diseases. Upon systematic review, patient mentioned lower back pain that improves with exercise. Given the information in the history, what is the most likely diagnosis?

A. Keratitis.
B. Angle-closure glaucoma.
C. Allergic conjunctivitis.
D. Acute anterior uveitis.

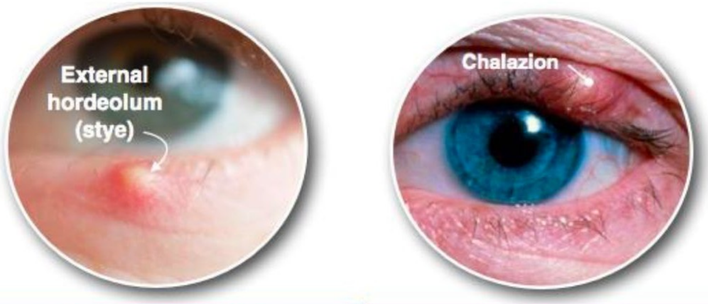
Answer: D.

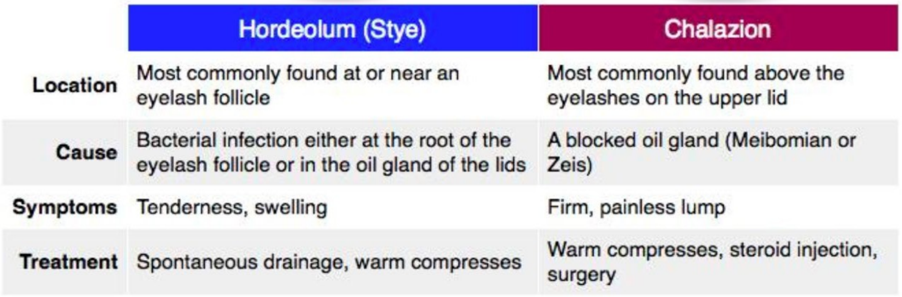
Uveitis typically presents as acute unilateral pain, photophobia, and blurring of vision. Uveitis may be the first problem to require medical evaluation and should alert clinicians to the possibility of spondylarthritis. Approximately 50 percent of patients with acute recurrent unilateral anterior uveitis have a form of spondylarthritis.

A 22-year-old female presented with painful swelling in lower eyelid. On examination there is a tender swelling in the lower eyelid with mild erythema. What is the most likely Diagnosis?

A. Chalazion.
B. Stye.

Answer: B.





	Hordeolum (Stye)	Chalazion
Location	Most commonly found at or near an eyelash follicle	Most commonly found above the eyelashes on the upper lid
Cause	Bacterial infection either at the root of the eyelash follicle or in the oil gland of the lids	A blocked oil gland (Meibomian or Zeis)
Symptoms	Tenderness, swelling	Firm, painless lump
Treatment	Spontaneous drainage, warm compresses	Warm compresses, steroid injection, surgery

Elderly male presented with eye itching, mild swelling. On examination there is mild congestion in cornea, scales over the eyelid margins, mild swelling of eyelids. Which one of the following is most likely treatment?

A. Antibiotics eye drops.
B. Oral antibiotics.
C. Warm compressors with cleaning.
D. Topical betamethasone.

Answer: C.

Treatment of blepharitis consists initially of warm compresses, eyelid scrubs and application of antibiotic ointment. Warm compresses should be applied for 15 minutes twice a day. This step loosens irritating crustsin the eyelashes and melts the oil produced by the meibomian glands, which can occlude the gland orifices.The eyelids should be scrubbed after the warm compress is removed. Baby shampoo mixed with water produces a soapy solution. With the eyelids closed, the eyelid margin region should be gently scrubbed with this solution, using a cotton-tipped applicator, wash cloth or finger.

Which of the following suggests episcleritis?

A. Gritty sensation on the eye and eyelid margins.
B. Photophobia.
C. Painless or mild pain.

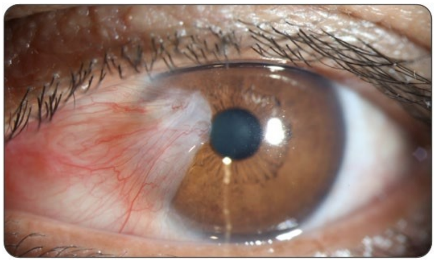
Answer: C.

Episcleritis is a self-limited condition that can be idiopathic and presents with mild discomfort and focal hyperemia. Conjunctivitis is typically associated with a discharge that is clear in viral cases and mucopurulent in bacterial cases. Iritis is associated with significant pain, a poorly reactive pupil, diminished vision, and photophobia. This patient does not have changes in visual acuity, photophobia, or severe pain as seen in keratitis, which would also cause an abnormal fluorescein stain showing corneal ulceration.

Promotion 2021

A 32-year-old man presents with gradual changes in the appearance of his eye over the past year. Physical examination reveals findings seen in the image above. Which of the following is the most likely diagnosis?

A. Conjunctivitis.
B. Foreign body.
C. Pinguecula.
D. Pterygium.

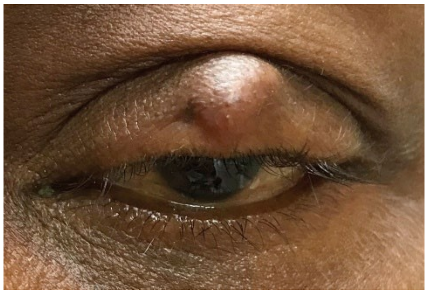


Answer: D.

A pterygium is a benign wedge of fibrovascular conjunctival tissue that grows from the nasal edge of the eye, extending in the horizontal axis laterally onto the cornea. Patients may complain of the changing appearance of their eye and sometimes of an irritating sensation. It is more common in men and in tropical regions. The pterygium grows gradually over months to years and may become inflamed periodically. It is most often bilateral. It does not threaten vision unless its growth extends into the visual axis. Topical lubricant drops may relieve symptoms of irritation. Surgical treatment is possible if the pterygium begins to affect vision, but the pterygium often recurs with additional inflammation postoperatively.

A 24-year-old woman presents to the clinic with a three-week history of a nontender lump on her right inner eyelid. She denies vision changes, ocular discharge, or fever. Physical examination reveals a nontender, yellow-white, rubbery nodule on the inner aspect of the mid-lower eyelid. Which of the following is the most likely diagnosis?

A. Chalazion.
B. Hordeolum.
C. Milia.
D. Xanthelasma.



Answer: A.

Question about management of chalazion?
Answer: …

Warm compressor.

A case of chemical eye irritation, what to do first?

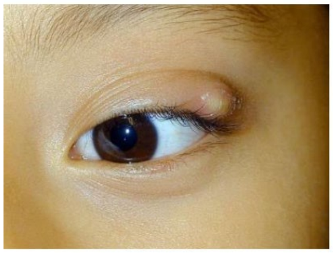
A. Irrigation.

Answer: A.

ABFM 2020

A 12-year-old female is brought to your office because of a lesion on her left lateral upper eyelid (shown below). The lesion started 3 days ago as a small, red "pimple," and since then it has increased in size and is tender. She does not have any fever, tearing, or conjunctival irritation. No treatment has been attempted. Which one of the following would be the most appropriate initial management?

A. Warm, damp compresses for 10 minutes four times daily.
B. Topical erythromycin ophthalmic ointment (Ilotycin).
C. Topical hydrocortisone 0.5%.
D. Systemic antibiotics with coverage for staphylococci.
E. Incisional drainage using a sterile 18- or 20-gauge needle.



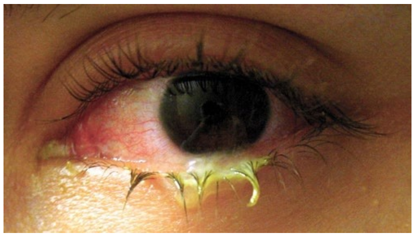
Answer: A.

This patient presents with an external hordeolum or stye. Warm, damp compresses for 10 minutes four times a day would be the best initial management. Topical erythromycin ointment and topical hydrocortisone cream are not indicated for treatment of a stye. Although staphylococci are commonly involved in this process, antibiotics are not recommended unless there is evidence of adjoining cellulitis. Warm compresses allow for spontaneous drainage and resolution. Anti-inflammatory medications are not recommended for hordeolum externum management, however they could become necessary if it becomesa chalazion. If the hordeolum has not resolved in about 1 week, incision may be necessary.

Part 1 2020

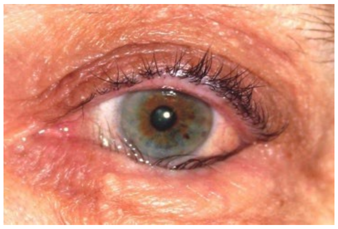
A Yong man present with red eyes were stuck can't open after waking up, (as shown below). Which one of the following would be the most appropriate management?

A. Topical chloramphenicol.
B. Oral antibiotic.
C. Steroid.
D. Antihistamine.
E. Topical Sodium sulfacetamide.



Answer: A.
Bacterial conjunctivitis.

A Patient come to complain about red eye with tearing and itching (as shown below). What is the most likely the diagnosis?



A. Entropion.
B. Ectropion.
C. Blepharitis.

Answer: A.
Entropion is a condition in which your eyelid, usually the lower one, is turned inward so that your eyelashes rub against your eyeball, causing discomfort.

Rheumatoid arthritis patient came with red eye, vision disturbance and dryness. What is the diagnosis?

A. Uveitis.
B. Keratitis.
C. Conjunctivitis.
D. Keratoconjunctivitis sicca.

Answer: D.
The questions is not complete but KCS, as a manifestation of lacrimal gland pathology, is the most common ophthalmic manifestation of RA, occurring in as many as 15 to 25 percent of patients. Symptomatic and objective signs of KCS are Foreign-body sensation, ocular dryness and grittiness, Hyperemia, Mucoid discharge, Ocular irritation, Excessive tearing (secondary to reflex secretion), Photophobia and Fluctuating or blurry vision.

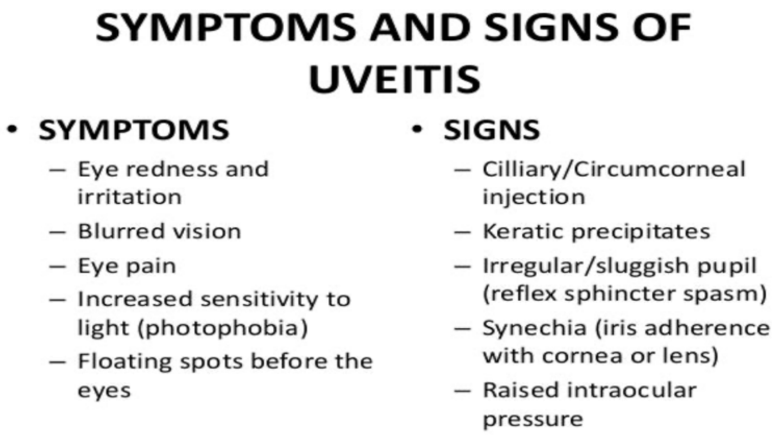
Mid-Year 2020

A Patient with anterior uveitis, what is the symptom associated with it?

A. Photophobia.
B. Glutinous in eyelid margin.
C. Itching.
D. Discharge that shuts the eyelids in the morning.

Answer: A.

All other symptoms are suggestive of conjunctivitis.



SYMPTOMS AND SIGNS OF UVEITIS

- SYMPTOMS
  - Eye redness and irritation
  - Blurred vision
  - Eye pain
  - Increased sensitivity to light (photophobia)
  - Floating spots before the eyes
- SIGNS
  - Cilliary/Circumcorneal injection
  - Keratic precipitates
  - Irregular/sluggish pupil (reflex sphincter spasm)
  - Synechia (iris adherence with cornea or lens)
  - Raised intraocular pressure

Old patient came to your clinic presented with well demarcated red spot in sclera (lateral) started this morning after waking up. He doesn't have no blurry vision and no alarm symptom. What to do next?

A. Reassure.
B. Urgent ophthalmology.
C. Check INR level.

Answer: A.

This is subconjunctival hemorrhage, looks scary but needs only reassurance.

A young boy presented in emergency with watering and photophobia of right eye. Which test is appropriate?

A. Tear breakup time.
B. Schirmer test.
C. Rose Bengal staining.
D. Fluorescein staining.

Answer: D.

This Patient most likely had corneal injury, and, in this situation, we will use fluorescein staining to diagnose. Signs and symptoms of corneal abrasion include: Pain, gritty feeling in the eye, Tearing, Redness, Sensitivity to the light and Headache.

Mid-Year 2019

An 18-year-old man brought to the Emergency department after slipping during a basketball game and hitting his right side of face on the other player's knee. Since the event he has been feeling nauseated and has vomited twice. He denied loss of consciousness and he is alert and oriented. On examination, the patient has 20/25 vision in both eyes, and his pupils are equal, round and brisky reactive without difference. His fundoscopic examination is normal in both eyes. CT skull reveals fracture of the right orbital floor with mild displacement. What is the most important next step in this patient's evaluation?

A. Perform fluorescence staining of the cornea.
B. Obtain an advanced testing for visual field.
C. Assess the extra-ocular motility.
D. Assess for diminished sensation in the distribution of the second branch of the fifth cranial nerve.

Answer: C.

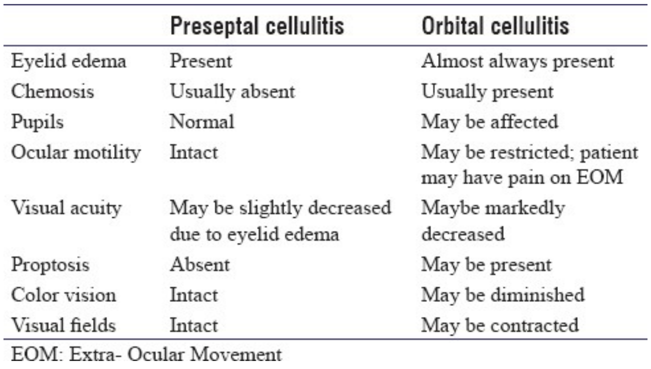
When an orbital floor fracture is suspected, the presence or absence of enophthalmos should be noted and the measurement of extraocular motility is vital.

A 4-year-old girl presents with right-eye redness and swelling of the lid that she and her parents noticed yesterday morning when she woke up. They gave her two doses of diphenhydramine yesterday, but the symptoms have not improved. They report that she has been playing outdoors the past 2 days, but no history of ocular trauma. She has no significant medical history, and no known allergy. On examination, she is afebrile and appears well. Erythema and edema surround the right eye and involve both the upper and lower lids. She has no proptosis. She has difficulty opening the right eye but can demonstrate full extraocular movements. Her conjunctiva is normal. She correctly identifies shapes on visual acuity exam. Her pupils areequal, round, and reactive to light. Which of the following regarding caring this patient is CORRECT?

A. The patient has orbital cellulitis and needs admission for IV antibiotics therapy.
B. The patient requires CT of the orbit.
C. The patient most likely has pre-septal cellulitis and require oral cephalexin with follow up in 24 to 48 days.
D. The patient requires fluorescent staining to rule out corneal injury.

Answer: C.

As there is no corneal involvement or symptoms suggest corneal involvement, so D is wrong. Other Options: A-B is for Orbital cellulitis and from the history it’s not. So, the answer is C.



	Preseptal cellulitis	Orbital cellulitis
Eyelid edema	Present	Almost always present
Chemosis	Usually absent	Usually present
Pupils	Normal	May be affected
Ocular motility	Intact	May be restricted; patient may have pain on EOM
Visual acuity	May be slightly decreased due to eyelid edema	Maybe markedly decreased
Proptosis	Absent	May be present
Color vision	Intact	May be diminished
Visual fields	Intact	May be contracted

EOM: Extra- Ocular Movement

Pretest

You are seeing a 26-year-old male patient complaining of a red eye who says, “I think I have pink eye.” He reports redness, irritation, tearing, watery discharge, and fairly intense eye pain. Which of his reported symptoms is more suggestive of something other than conjunctivitis?

A. Redness.
B. Irritation.
C. Tearing.
D. Discharge.
E. Pain.

Answer: E.

Conjunctivitis is the most common cause of red eye seen in the primary care office. Symptoms of conjunctivitis include increased redness, irritation, tearing, discharge, and/or itching. The character of the eye discharge is sometimes useful in distinguishing bacterial from viral conjunctivitis, with bacterial causes associated with purulent discharge and viral causes associated with more watery discharge. However, one meta-analysis recently failed to find evidence that discharge character is diagnostically useful. Eye pain is suggestive of a more serious problem, possibly acute angle closure glaucoma, uveitis, keratitis, a foreign body, or a corneal abrasion.

You are seeing a 20-year-old college student who reports that her left eye became pink over the last 24 hours. She is otherwise healthy and takes no medications except oral contraceptives. She reports redness, irritation, tearing, discharge, and itching. Which of her symptoms are more specific for an allergic etiology for her condition?

A. Single eye involvement.
B. Irritation.
C. Tearing.
D. Discharge.
E. Itching.

Answer: E.

Of the symptoms of conjunctivitis, itching is more specific for allergic conditions. Irritation, tearing, and discharge are more general symptoms, and not useful in differentiating allergic conjunctivitis from other causes. Allergic conjunctivitis is more characteristically bilateral; therefore, single-eye involvement in this case would not point to allergic conjunctivitis.

You are caring for a 3-year-old boy who goes to daycare while his parents are at work. His mother brought him to see you because the daycare will not take him back until he’s had a doctor evaluate his eye symptoms. He developed an acute redness of the left eye, associated with runny nose, cough, and increased irritability. On examination, his eye is red and watery. The discharge is clear, and he has mild eyelid edema. Which of the following is the most common cause for his condition?

A. Coxsackie virus.
B. Parainfluenza virus.
C. Adenovirus.
D. Rhinovirus.
E. Herpesvirus.

Answer: C.
Viral conjunctivitis is most commonly caused by members of the Adenovirus family. It can be transmitted through ocular and respiratory secretions and less commonly from fomites on towels or equipment.Typically, it starts in one eye, and spreads to the other after a few days. The natural course is self-limiting, lasting around 10 to 14 days. It is highly contagious, and people diagnosed should avoid close contact with others for up to weeks. Supportive treatment is indicated. Although topical antibiotics have been prescribed to try to prevent bacterial superinfection, there is no good evidence that it makes any significant impact.

You are seeing a 4-year-old boy whose mother brought him in to be assessed. He’s been irritable and feverish for 3 days, with runny nose, slight cough, and ear pain. Today, he woke up with bilateral eye redness and discharge. After evaluation and examination, you diagnose otitis media and bilateral conjunctivitis. You are treating his otitis media with high-dose amoxicillin therapy. Which of the following is true regardingtreatment of his conjunctivitis?

A. No additional treatment is necessary.
B. Treatment with a topical antibiotic ophthalmologic solution is indicated.
C. Treatment with a topical antibiotic ophthalmologic ointment is indicated.
D. Treatment with a topical antiviral ophthalmologic solution is indicated.
E. Treatment with a topical corticosteroid is indicated.

Answer: A.
The patient described in the question has conjunctivitis-otitis media syndrome. It is a common condition in which children with otitis media also have a purulent ocular discharge and bilateral conjunctivitis. It responds to treatment for the otitis media, and therefore no additional treatment for the conjunctivitis is necessary.

You are caring for a 21-year-old college junior who comes to see you for a red eye. He noticed the problem after waking up this morning, and it caused him significant concern. He denies eye pain, loss of vision, discharge, or trauma. He has never had an episode like this before. He reports that he was very ill yesterday with nausea and intense vomiting for several hours, but is feeling better today. On examination, you note a localized and sharply circumscribed bright red patch on his left eye. Which of the following statements is true?

A. Trauma is the likely cause.
B. Underlying hypertension is the likely cause.
C. An unrecognized bleeding disorder is the likely cause.
D. Increased intrathoracic pressure is the likely cause.
E. Referral to an ophthalmologist is indicated.

Answer: D.

The patient in this question has a subconjunctival hemorrhage. In this condition, the redness of the eye is localized and sharply circumscribed, with the underlying sclera not being visible. There is generally no discharge, no pain, and no vision disturbance. These hemorrhages can be spontaneous, but can also arise from trauma, hypertension, bleeding disorders, or from straining (as with severe coughing, retching, or straining during defecation). In this case, the intrathoracic pressure increase from patient's vomiting is the likely cause. Referral to an ophthalmologist is only indicated if the hemorrhage is from trauma, or if it does not spontaneously resolve in 2 to 3 weeks. If there are recurrent episodes, consideration of other causes should be included in the differential.

AFBM 2019 – 2017

A 30-year-old female sees you for a routine health maintenance visit. She has myopia and says she is considering LASIK eye surgery and wants your advice. You tell her that LASIK is associated with

A. A moderate reduction in problems with glare.
B. A moderate reduction in problems with dry eyes.
C. Satisfactory improvement of vision in almost all patients.
D. Prevention of presbyopia.

Answer: C.

LASIK corrective vision surgery has become increasingly common over the last 20 years. A laser is used to cut a flap the size of a contact lens consisting of corneal epithelium and stroma. This flap is repositioned and heals without sutures. It is important to counsel patients on realistic expectations. Vision following the procedure may not be as clear as with glasses or contact lenses and some individuals still require external correction. Up to 40% of patients experience dry eyes following the surgery (SOR B). These symptoms may be worse in patients with chronic pain syndromes such as fibromyalgia, migraine, and irritable bowel syndrome (SOR C). Glares, halos, and starbursts may affect up to 20% of patients following LASIK. This may be especially bothersome at night (SOR B). LASIK does not correct age-related presbyopia (SOR C). Reading gslasses may be necessary if this develops in certain patients. Overall, however, most patients are satisfied with their results and only 3% are unhappy with their vision following surgery (SOR C).

A 78-year-old female presents with a red eye. She reports drainage and pain in her left eye since she woke up today, but no photophobia. Examination of the eye shows conjunctival erythema and a mucopurulent discharge. The pupil is normal in size and reactive to light. Which one of the following should prompt immediate referral to an ophthalmologist?

A. Bilateral eye redness.
B. A corneal abrasion noted on fluorescein staining.
C. Copious mucopurulent drainage from the eye.
D. Bright red blood noted under the conjunctiva.
E. Reduction of visual acuity.

Answer: E.
Reduced visual acuity may be a symptom of acute angle-closure glaucoma and requires immediate referral to an ophthalmologist. Copious mucopurulent drainage from the eye is a sign of infectious conjunctivitis, most likely bacterial, and bilateral eye redness is typically seen with allergic conjunctivitis. Allergic or infectious conjunctivitis and small corneal abrasions can be managed by the family physician. Bright red blood under the conjunctiva is consistent with a subconjunctival hemorrhage that will typically resolve without intervention.

A 29-year-old female presents with redness of her left eye. She has just returned from a summer beach vacation with her children and woke up with a red eye. Your examination reveals a watery discharge, a hyperemic conjunctiva, and a palpable preauricular lymph node. Her cornea is clear on fluorescein staining. Which one of the following is most appropriate for this patient?

A. Reassurance only.
B. Culture-guided antibiotic therapy.
C. Quinolone eyedrops.
D. Corticosteroid/antibiotic eyedrops.
E. Urgent ophthalmologic referral.

Answer: A.
Viruses cause 80% of infectious conjunctivitis cases and viral conjunctivitis usually requires no treatment. Bacterial conjunctivitis is associated with mattering and adherence of the eyelids. Topical antibiotics reduce the duration of bacterial conjunctivitis but have no effect on viral conjunctivitis. Allergic conjunctivitis would be more likely if the patient reported itching. Antibiotics or corticosteroids would not be helpful in this patient and would not prevent complications. The majority of cases of viral conjunctivitis are caused by adenoviruses, which cause pharyngeal conjunctival fever and epidemic keratoconjunctivitis. Pharyngeal conjunctival fever is characterized by high fever, pharyngitis, and bilateral eye inflammation. Keratoconjunctivitis occurs in epidemics, and is associated with a watery discharge, hyperemia, and ipsilateral lymphadenopathy in >50% of cases.

A 63-year-old female presents with a complaint of a painful, red right eye. She says that her vision has also been blurry. She has also noted a discharge. The patient wears contact lenses. When you examine the patient, you note photophobia. The pupils are equal, round, and reactive to light. You also note unilateral diffuse injection. Fluorescein staining reveals focal corneal uptake. Which one of the following is the most likely diagnosis?

A. Corneal abrasion.
B. Subconjunctival hemorrhage.
C. Uveitis.
D. Acute angle-closure glaucoma.
E. Herpes zoster ophthalmicus.

Answer: A.
Common causes of red eye include infectious conjunctivitis, allergies, corneal abrasion, keratoconjunctivitis, subconjunctival hemorrhage, uveitis, blepharitis, iritis, acute angle-closure glaucoma, and herpes zoster ophthalmicus. Viral infections typically cause conjunctivitis with mild pain and no loss of vision. The problem is usually unilateral in the beginning and a watery to serous discharge may be noted. Adenovirus is the most common cause. Acute bacterial conjunctivitis has a similar presentation and may include eyelid edema and a purulent discharge. Allergic conjunctivitis is usually bilateral and painless, with intense itching, and a stringy or ropy watery discharge. Herpes zoster ophthalmicus is associated with a vesicular rash, keratitis, and uveitis. The rash is preceded by pain and a tingling sensation. Findings include conjunctivitis and dermatomal involvement, which are usually unilateral. With corneal abrasion there is usually a history of an injury involving a foreign object. Signs and symptoms include severe eye pain; red, watery eyes; photophobia; and a foreign body sensation. Vision is usually normal and pupils are equal and reactive to light. Symptoms of uveitis include a red eye, loss of vision, and photophobia. It is associated with many autoimmune diseases, including reactive arthritis, ankylosing spondylitis, and inflammatory bowel disease. Acute angle-closure glaucoma causes a significant loss of vision, with dilated pupils that don't react normally to light. Symptomsinclude severe pain and watery eyes, with halos around lights. Patients may have nausea and vomiting. This form of glaucoma often has an acute onset.

A 68-year-old female sees you because she developed increased floaters followed by flashes of lights after a sneezing attack. She then noted a dark spot in the periphery of her right eye. Three weeks ago, she underwent cataract removal with intraocular lens implantation in this eye. Her examination is notable for decreased visual acuity and a loss of peripheral field in the right eye. Which one of the following is the mostlikely diagnosis?

A. Posterior vitreous detachment.
B. Central retinal artery occlusion.
C. Retinal detachment.
D. Intraocular lens dislocation.
E. Acute angle-closure glaucoma.

Answer: C.
Retinal detachments can be caused by a break in the retina, exudate or leakage from beneath the retina, or traction on the retina. Retinal detachments are often preceded by a posterior vitreous detachment, which can lead to a break in the retina, and patients may experience an increase in floaters but not light flashes or loss of vision. With a retinal detachment, patients typically experience floaters followed within 1 week by

flashes of light as the retina tears. If the retinal tear becomes large enough vision is impaired. Any patient with the typical history and loss of visual acuity or peripheral field should be urgently referred to an ophthalmologist, as urgent surgery may be required. Risk factors for retinal detachment include age 50–75, ocular trauma, previous cataract surgery, family history, and a past history of retinal detachment. A patient with a previous retinal detachment has a 25% risk of developing a retinal detachment in the other eye. Myopia is the other significant risk factor, associated with a tenfold increased risk in patients with >3 diopters of refractive error. Central retinal artery occlusion is manifested by painless complete loss of vision in the affected eye. Acute angle-closure glaucoma is associated with eye pain, photophobia, headache, nausea and vomiting, and cloudy loss of vision, and the onset is not typically associated with coughing or sneezing.

You are seeing a 32-year-old nurse who was treated in an urgent care for bacterial conjunctivitis. Despite the appropriate use of ciprofloxacin ophthalmic solution over the last 4 days, her purulent discharge and erythema has not improved. What should be the next step in treatment of this patient?

A. Ciprofloxacin ointment.
B. Polymyxin-trimethoprim ophthalmic solution.
C. Oral ciprofloxacin.
D. Oral sulfamethoxazole-trimethoprim.
E. Immediate ophthalmologic referral.

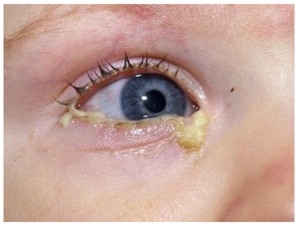
Answer: D.

Bacterial conjunctivitis is most commonly caused by *Streptococcus* and *Staphylococcus.* However, there are increasing reports of conjunctivitis caused by methicillin- resistant *S aureus* (MRSA). MRSA conjunctivitis manifests as bacterial conjunctivitis resistant to conventional therapy, and is treated with the same drugs used to treat MRSA in other parts of the body. Cultures should be obtained when MRSA is suspected. It is likely that the other oral or topical antibiotics listed would not cure MRSA, and an ophthalmology referral is not necessary unless treatment is unsuccessful.

Promotion 2017-2019

A baby 9-month-old with yellowish discoloration, what is the treatment?

A. Gentamicin cream.
B. Tobramycin ointment.
C. Erythromycin ointment.
D. Ciprofloxacin ointment.



Answer: D?.

Topical therapy is warranted in most cases, and topical fluoroquinolones are more potent than other classesof topical agents. Cost and formulary restrictions may encourage clinicians to use polymyxin B/trimethoprimor neomycin combinations as first-line agents. Sulfa drugs, aminoglycosides, and erythromycin should not be

used for the treatment of pediatric conjunctivitis. Azithromycin may be considered for patients with hypersensitivity reactions to other agents.
https://www.healio.com/news/pediatrics/20120331/pediatric-acute-bacterial-conjunctivitis-an-update

67-year-old patient with decrease vision at night, what is most likely diagnosis?

A. Senile cataract.

Answer: A.

A female patient on contact lens, developed conjunctivitis, most likely causative agent?

A. Pseudomonas.

Answer: A

Types of bacteria that commonly cause bacterial conjunctivitis include:

- Pseudomonas aeruginosa.
- Staphylococcus aureus.

Most important action in viral conjunctivitis?

A. Prevent transmission.
B. Local antibiotic.

Answer A.

Viral conjunctivitis caused by the adenovirus is highly contagious, usually spreads through direct contact with contaminated fingers, medical instruments, swimming pool water, or personal items. It is often associated with an upper respiratory infection spread through coughing. To prevent the spread of viral conjunctivitis, patients should be counseled to practice strict hand washing and avoid sharing personal items; food handlers and health care workers should not work until eye discharge ceases; and physicians should clean instruments after every use.

A diabetic patient after his annual visit diagnosed with pre-proliferative retinopathy, after dilatation of the eye he present to ER complaining of decrease vision and eye pain. What is the most probably diagnosis?

A. Optic ischemia.

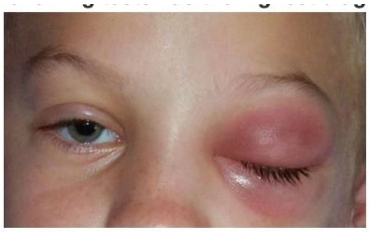
B. Keratitis secondary to the mydriatic drugs.
C. Acute angle closure glaucoma.

Answer: C.

Acute angle closure is an urgent but uncommon dramatic symptomatic event with blurring of vision, painful red eye, headache, nausea, and vomiting. Diagnosis is made by noting high intraocular pressure (IOP), corneal edema, shallow anterior chamber, and a closed angle on gonioscopy. Medical or surgical therapy is directed at widening the angle and preventing further angle closure. If glaucoma has developed, it is treated with therapies to lower IOP.

Miscellaneous Qs

Child had URTI 3 days ago presented with left eye swelling. Which of the following tests has the highest diagnostic value?



A. Eye swab.
B. Orbital CT.
C. Blood culture.
D. Ophthalmology referral.
E. Orbital X-ray.

Answer: B.

The clinical signs help to distinguish periorbital from orbital cellulitis. Periorbital infection causes erythema, induration, and tenderness of the periorbital tissues, with patients rarely showing signs of systemic illness. The latter signs are more likely if the infection results from bacteremia. Orbital cellulitis may have the same signs and symptoms in the periorbital tissue but also results in proptosis, edema of the conjunctiva, ophthalmoplegia, or decreased visual acuity. Because the eyelids usually are swollen shut, computed tomographic (CT) scanning with contrast infusion may be necessary to confirm the diagnosis.

A 68-year-old man with controlled hypertension complains of gradual impairment of vision. His history further reveals that he was recently diagnosed with mild adult-onset diabetes that is also well controlled. He is a retired fisherman. The most likely cause of his visual impairment is:

A. Diabetic retinopathy.
B. Cataract.
C. Glaucoma.
D. Macular degeneration.

Answer: B.

As patient is well controlled DM, so we can exclude A. Risk factor for B: Smoking, diabetes, traumatic injury, medications, UV exposure and alcohol. Risk factor for D: smoking, being overweight and having high blood pressure or cardiovascular disease. So, based on what we have, B is most likely. (Revised by Optha. Resident).

Good Luck!